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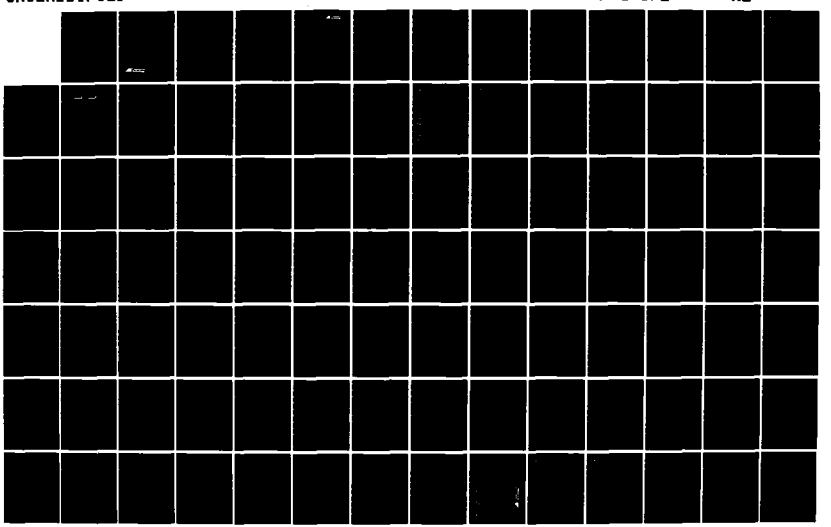

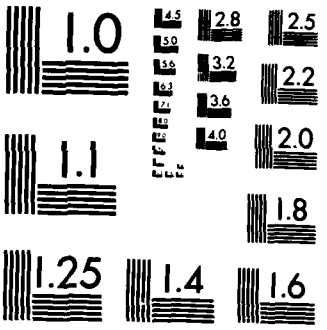

DEFENSE LOGISTICS AGENCY

OFFICE OF TELECOMMUNICATIONS AND INFORMATION SYSTEMS

DLA DATA/DATA BASE ADMINISTRATION ANALYSIS

FINAL REPORT

Advanced Technology

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The scope of this study addresses the following three questions:

o What Data/Data Base Administration (D/DBA) functions have to be performed to effectively manage the D/DBA environment in DLA?

o What tools are needed to support the D/DBA functions?

o What is the required organizational structure for the functions and tools and where should they be located throughout DLA?

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The goal of this study is to conduct an extensive review and assessment of existing Data/Data Base Administration methods and procedures to develop concepts, directions, and an organizational approach in accomplishing the management of automated information DLA wide.
Originator-supplied keywords included: → front
This study is not an Information Resources Management study (IRM).

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Advanced Technology

February 26, 1985

Mr. John Whittaker
Defense Logistics Agency
Office of Telecommunications
and Information Systems
DLA-ZW
Cameron Station
Alexandria, Virginia 22314

Reference: Contract No. DLAH000-83-D-0225

Subject: Transmittal of Final Report Under
Delivery Order No. 016

Dear Mr. Whittaker:

Advanced Technology Inc., is pleased to submit the Final Report for the DLA Data/Data Base Administration task. Should you have any questions please call myself (703) 620-8592, or Mr. Robert Fuss (703) 620-8643.

Sincerely,

Richard Girouard

Richard Girouard
Manager
Systems Technology Operations Center

Attachments

cc: S. Endres
R. DeBastiani
Project File

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SECTION 1. INTRODUCTION

To manage is to plan for, to allocate, and to conserve resources. Data is a resource. It has the same characteristics of cost, value, and scarcity, as do the more familiar material, financial, and personnel resources. As the recognition of the value and cost of information increases in the Department of Defense, the effective management of this resource becomes increasingly important to Headquarters, Defense Logistics Agency (HQ, DLA).

Considering the size and complexity of operations, the management structure, and the impact of its decisions, DLA needs to have the best information available for decision-making. Effective management of information entails understanding what data is available, keeping track of where the data is, and knowing who is responsible for it. In a large organization, such as DLA, this is extremely difficult. Each individual agency is capable of managing its own data, but there is no explicit management of the data that flows among organizational groups or across systems. Furthermore, the individual groups and systems tends to manage their own data in different ways, making the correlation of data at higher levels difficult or impossible. Who has access to the data, who actually uses the data, under what conditions are the data valid, when can it be released by an organization, when can it be removed or changed, how can it be shared among organizations, are all questions relevant to the management of the data resource.

Such questions are, at best, difficult and, sometimes, impossible to answer consistently across DLA. And yet, the answers to such questions are central to data sharing to achieve improved management reporting and more effective decision-making.

The problems associated with managing the data resource can be grouped loosely into two categories: management and technical. In the management category are the issues of setting information management goals and directions, of establishing information management policies and plans for achieving those goals, and finally of managing the execution of the information management plan. The technical problems deal with the details of implementation.

The purpose of this introductory chapter is to acquaint the reader with the Data/Data Base Administration:

- Study Objectives
- Study Methodology
- Scope of Study

A discussion of each of these categories follows.

1.1 Study Objectives

DLA is committed to installing commercial DBMSs throughout the Agency. In order to utilize data base technology in the most effective manner, the goal of this study is to conduct an extensive review and assessment of existing Data/Data Base Administration methods and

procedures and to develop concepts, directions, and an organizational approach for use by DLA in accomplishing the management of automated information DLA wide. The specific objectives of this study are: (see Exhibit 1-1)

- Assess the current Data/Data Base Administration Environment on a DLA Wide Scope and document the results of that review;
- Make recommendations for organizing and conducting the Data/Data Base Administration functions; and
- Development of a Time-Phased Plan for Implementing the Data/Data Base Administration Program

In the first phase of this study, we concentrated on assessing the existing data/data base administration environment within DLA today. We presented the results of that assessment in a separate report and briefing to DLA in August 1984. Section 2 of this report provides a summary of those key issues that surfaced in our assessment of the current DLA D/DBA environment.

1.2 Study Methodology Employed

An overview of the methodology employed by Advanced Technology is presented in Exhibit 1-2. As indicated in the exhibit, the development of an effective Data/Data Base Administration program was based initially upon developing a sound understanding of the current D/DBA environment DLA wide.

Project Objectives

- Determination of the Requirements for Effective Data/Data Base Administration Among the DLA Organizational Elements
- Recommendation of Data/Data Base Administration Program Which Can Be Used To Manage Effectively the DLA's Automated Information Resources
- Recommendation of Data/Data Base Administration Structure and the Necessary Policies Required To Administer the Automated Information Management Program
- Development of a Time-Phased Plan for Implementing the Data/Data Base Administration Program.

EXHIBIT 1.1 D/DBA PROJECT OBJECTIVES

SECTION 3. PRINCIPLES OF D/DBA ENVIRONMENT

Data Base is a change in management, not merely a change in software. The maximum benefits of a data base environment are realized by an organization when it recognizes data as a resource; similar to the value of managing money. Considering the amount of time and resources that are invested in the collection, storage, and reporting of data, it is a logical step to manage data like other organizational resources.

This section presents some basic principles that need to be accepted if an organization is to achieve a well-managed data base environment.

3.1 Management Perspective

Data are sufficiently important to merit specialized and high level management attention. A shift in the management perspective of this size requires the acceptance of the following three principles by top management:

- A DATA BASE ENVIRONMENT IS A CHANGE IN MANAGEMENT, NOT MERELY A CHANGE IN SOFTWARE

  Data in an organization should be managed directly and separately from the functions which use that data.

  Data Base Management Systems are a tool to store and retrieve data. The effective management of the data is the foundation for the effective use of a DBMS. Data should be treated as a primary resource in their own right, independently of current machines and systems.

DLA D/DBA SIGNIFICANT ISSUES

RECOGNIZED ISSUE	REQUIREMENT
• Lack of DLA-wide strategic planning of data	DLA-wide strategic data planning
• Lack of detailed knowledge on degree of data sharing across systems and functions	Integrated data planning, integrated automated tools
• Current D/DBA policies/procedures embedded in LCM procedures inhibits effective management of data as a resource	More explication of D/DBA objectives, policies, procedures
• Lack of an extensive and institutionalized D/DBA training/education program	Appropriate education for all involved end-users
• Enforcement of data element standards	More centralized authority and control
• Current data dictionaries do not fully support data element standardization	Implementation of active and passive data dictionaries that interface with one another
• Flexibility	Develop procedures to permit data-base change with minimum impact on application systems

EXHIBIT 2-4

Subsequent sections provide some basic principles for effectively managing an organization's Data/Data Base environment. These principles and the key findings in this section are then used to develop a general design framework for DLA's D/DBA administration functions.

- LACK OF FLEXIBILITY - The DLA major AISs are designed and implemented for a static environment. Organizations change over time and the application system must adapt with them. Systems that are inflexible are slow to change and very costly to maintain.

The issues identified in Exhibit 2-4 have been developed from specific issues at individual DLA sites. As an example, our discussions of several sites resulted in the following observations.

- Some changes at DLSC take two years for approval, indicating inflexibility
- DLSC had to create its own training program
- The DLSC data dictionary is independent of the DBMS, therefore it does not enforce standards
- DSAC-M did not believe that D/DBA responsibilities were clearly defined; supporting the issue of D/DBA policies and procedures were embedded in LCM procedures.
- Different organizations used different DD/Ds and no specific organization claimed responsibility for strategic data planning.

Although these issues have been found in DLA, they are not unique; they can be found in other organizations. Many of these issues can be addressed providing a change in management emphasis takes place.

Exhibit 2-4 identifies the requirements for DLA to resolve these issues. The underlining theme to these requirements is that DLA should view data as a resource and to manage it, like other resources (e.g., money). This will require DLA to change its mind set as to the importance of data as a resource.

Exhibit 2-4 lists the major D/DBA findings that were identified during the study. A discussion of each finding follows:

- LACK OF STRATEGIC DATA PLANNING - Currently there is no DLA wide strategic data planning. Future effective management of an organization's data base environment requires high level views and functional views of the data. This top level data planning function identifies future information requirements, who are the 'owners' of the data, and who are the 'users' of the data. Lack of this data planning prevents the maximum value of the data that is collected and used from being utilized. Anticipating future data needs is one consideration of the strategic plan.

- LACK OF DETAIL DATA SHARING KNOWLEDGE - DLA is not currently aware of the data sharing among its major systems or the potential impact of converting independent batch systems into data sharing interactive systems. This information gap prevents the data from being organized in its most stable form. Unstable data will increase software maintenance costs over the long term.

- CURRENT D/DBA POLICIES/PROCEDURES EMBEDDED IN LCM PROCEDURES - Data as a resource is a concept not presently held by DLA management. Embedded D/DBA policies and procedures hinders the acceptance of data being managed as a resource and its importance being diminished.

- LACK OF AN EXTENSIVE AND INSTITUTIONALIZED D/DBA TRAINING/EDUCATION PROGRAM - Data/Data Base Administration concepts have evolved greatly over the last few years. The lack of a formal DLA D/DBA training/education program causes implementation problems due to a lack of understanding data base principles. End users do not fully understand the importance of up-front analysis.

- ENFORCEMENT OF DATA ELEMENT STANDARDS - DLA does not maintain nor uniformally use a central data dictionary which hinders Data Element Standardization. This causes incompatibility between application systems, the lack of data sharing, and excessive effort collecting and maintaining data.

- CURRENT DATA DICTIONARIES DO NOT FULLY SUPPORT DATA ELEMENT STANDARDIZATION - because they are not used in the analysis, design, and implementation life cycle phases. This permits non-standard data being defined and human intervention being required to manage the metadata and most steps of the AIS development.

DLA'S EXPERIENCE WITH DBMS AND DATA DICTIONARIES

SITE	SYSTEM	DATA BASE(S)	DBMS	DATA DICTIONARY
DLSC	DIDS	TIR SSR	DMS II	MEDIC
DTIC	DROLS	TR (WUIS) (IR&D) (PP)	DMS 1100	MANUAL
DCASR'S	MOCAS	CONTRACTS	TOTAL TIS	DESS/MSS
DSAC	DEVELOPMENT	DEVELOPMENT	TIS DBDAM SAMSAM	DESS/MSS
	RESEARCH	RESEARCH	ADABAS IMS	
DASC	ARMS DFAMS OTHERS	ARMS DFAMS OTHERS	M204	MODEL 204
DGSC	MOWASP	AWARE	ENCOMPASS	DESS/MSS
DPSC	DISMS	SUBSISTENCE	TIS	DESS/MSS
DDOU	DWASP	WAREHOUSE RECEIVING	TIS	DESS/MSS
SEVERAL	APCAPS	PERSONNEL	TIS	DESS/MSS
DISC	WEAPONS SYSTEMS	J-52/T-64 WEAPONS SYSTEMS	SEED	DESS/MSS

Exhibit 2-3

Existing Standards, Policies, and Procedures (Continued)

Standard, Policy, Or Procedure	Document(s)	Comments	Assigned Responsibility
Data Base Design *	DLAH 4730.1	Defines Documentation Format of Data Base Specs. Only.	CDA, PSE, AIS Admin Op Sites
Data Base Update/ Retrieval *	None	Determined by DBA at Field Site.	None
Backup and Recovery *	None	Determined by Individual Programmer or DBA at Field Site.	None
Standards Monitoring and Enforcement	DLAR 4700.1 DLAR 5000.12	Defines Reviews, Tests, and Approvals Within LCM. Defines Review of Functional Requirements.	DLA-Z, Op Sites
System Performance Monitoring	DLAM 4700.1	Provides Tools Available for Monitoring Hardware Performance	CDA, Op Sites
AIS Interfacing	DLAR 4700.1	Defines Its Existence Only.	DLA-Z, PSE
Data Sharing *	DLAR 4710.4 DLAR 4700.1	States That DLA Will Participate in Data Sharing.	DLA-Z

Note: * = Specific to Data/Data Base Management.

Individuals consulted during our visits to the field sites generally included the ADP Director, Systems Managers, Data Administrators, Data Base Administrators, Operations Managers and other key personnel as selected by the ADP Director. Current approaches as well as future plans for operation and administration of the D/DBA environment were discussed. The field site interviews provided personnel at these installations an opportunity to comment on and participate in the study effort. Prior to any field visits, the project staff reviewed any relevant background documentation provided by DLA HQ. From this review, we developed specific questions to supplement our standard set of questions.

As an example of our review and evaluation of the current D/DBA environment, Exhibit 2-2 shows a sample of current DLA documents that we examined and the extent they did or did not provide specific guidance, policies, or procedures on Data/Data Base Administration. Exhibit 2-3 provides a summary of DLA's current experiences with DBMSs and data dictionaries.

2.2 Summary of D/DBA Analysis Results and Key Issues

The results of our analysis of the current DLA D/DBA environment led to a number of key findings. We present a summary of these key findings in this section. The reader is encouraged to read the separate document for more detailed backup information.

results of these two research methods provided an overview of relevant data/data base administration activities as currently performed and administered at the DLA Headquarters, Central Design Agencies, and the Primary Level Field Activities.

As stated, our initial focus was directed toward gaining a greater understanding of DLA efforts to manage information. Documentation containing DLA ADP policies and procedures was reviewed. Exhibit 2-1 lists the documents used for review. The documents that we reviewed provided an overall view of DLA's ADP environment from which specific data/database administration functions, responsibilities and procedures were extracted. We analyzed these specific policies and procedures to determine the roles of different DLA organizations currently involved in some aspect of data/database administration.

The other source of data administration information came from a series of structured interviews with key personnel at DLA HQ, selected CDAs and PLFAs. At least one site from each of the Supply Centers, Depots, Service Centers and DCASRs was chosen for interviews as well as DLA-ZP, DLA-ZS and DLA-ZW. Exhibit 2-1 identified those sites interviewed. Information was sought specifically in the areas of data/database administration policies and programs currently being practiced at HQ and the sites. Interactions that PLFAs have between themselves and with DLA HQ were also examined, focusing on the strengths and weaknesses of current D/DBA standards, policies, and procedures.

Documents Used	Sites Interviewed
• DLA Telecommunication and Information Systems Plan (DTIP), 1983-1984.	• DTIC, Alexandria, Virginia
• DOD Logistics Data Resource Management System User Guide (LOGDRMS) DOD 4000.25, Jan. 1984.	• DSAC-TD, Columbus, Ohio
• DOD Logistics Data Element Standardization and Management Program Procedures (LOGDESMAP) DOD 4000.25, Jan. 1984	• DSACOMB, Columbus, Ohio • DCSC, Columbus, Ohio
• Life-Cycle Management of DLA AISs DLAR 4730.1 July 1982.	• DCASR Cleveland, Cleveland, Ohio
• DLA ADS Life-Cycle Management Specs. DLAH 4730.1 May 1978.	• DLSC, Battle Creek, Michigan
• Administration of the DLA ADP Program DLAR 4700.1, June 1978.	• Defense Depot, Ogden, Utah
• DLS Systems Automation Center Mission DLAR 58055.7, Oct. 1981.	• DASC, Alexandria, Virginia
• Maintenance of DLA Systems Automation Center Assigned AIS DLAR 4730-3, Nov. 1979.	• DFSC, Alexandria, Virginia
• Plan for DLA Corporate AIS Management Structure, Jan. 1983.	• DLA-ZS, Alexandria, Virginia
• Automated Data Processing Management Manual DLAM 4700.1, Nov. 1983.	• DLA-ZW, Alexandria, Virginia

EXHIBIT 2.1 D/DBA INFORMATION SOURCES

SECTION 2. CURRENT DLA/DBA ENVIRONMENT

The development of an effective data/database administration program for DLA requires a sound understanding of the current data/database environment.

During the period June through August 1984 we accomplished an extensive survey and review of DLA's current D/DBA environment. The results were published in a separate report and briefed to DLA in August 1984. This section provides a summary of those results. The reader is referred to the separate document for more detailed backup information.

2.1 Current D/DBA Analysis Approach

Our approach to surveying the current DLA D/DBA environment involved:

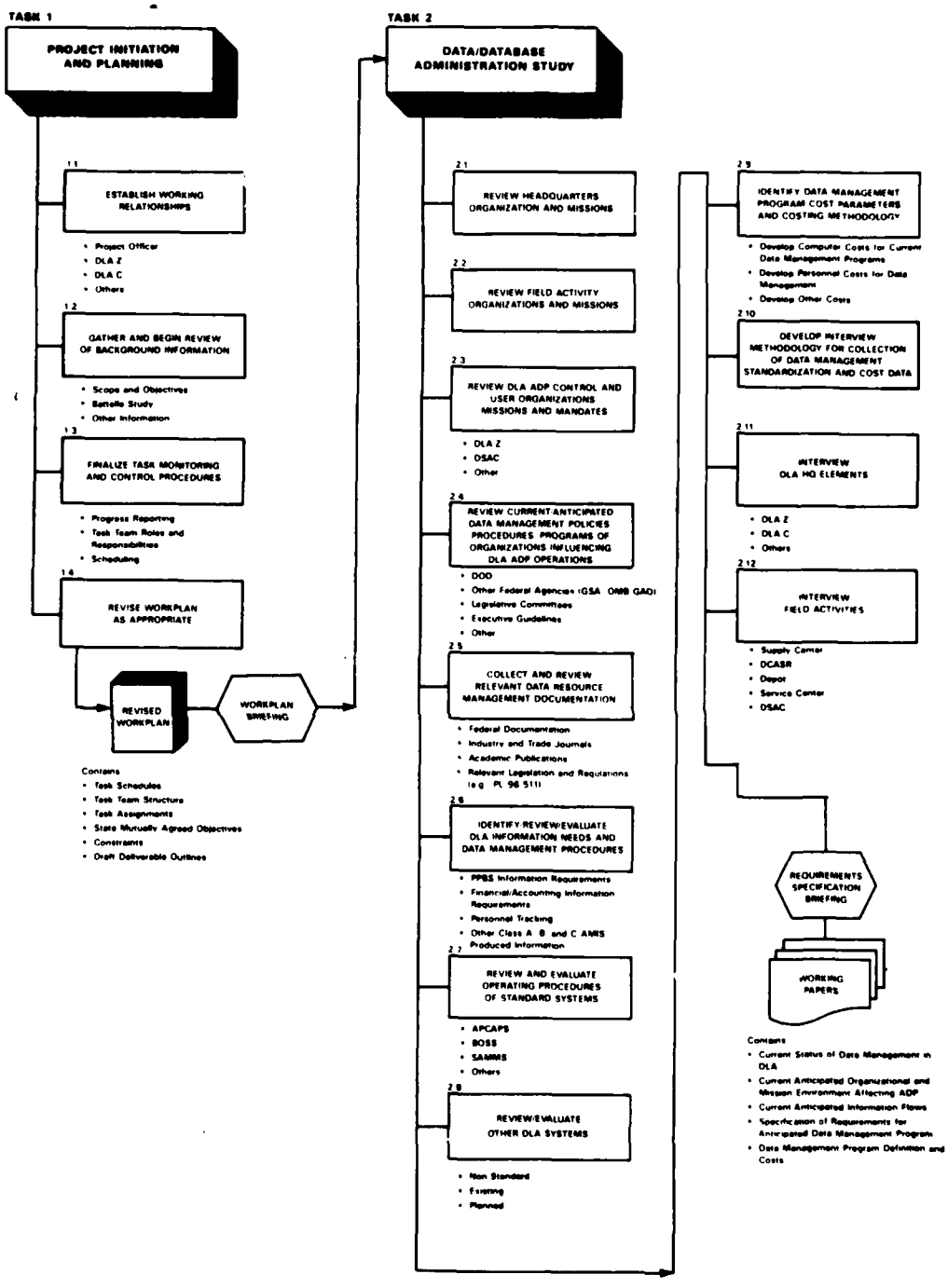
- An extensive review of existing DLA standards, policies, and procedures, and
- Conducting structured interviews.

We first gathered documentation on standards, policies and procedures pertaining to data/database administration. This documentation was supplemented with information collected from structured interviews conducted at both HQ DLA and various field sites. Exhibit 2-1 shows the documents we reviewed and the sites we visited. Knowledge of Automated Information Systems (AIS) and management practices, with regard to data/database administration, was obtained during these visits. The

Section 4, General Design Framework, identifies the required functions and tools needed to manage the Data/data base environment. This section addresses the first two questions.

Section 5 presents alternative considerations for locating the required D/DBA functions and tools within a proposed DLA D/DBA organizational structure. We discuss the advantages/disadvantages of the identified D/DBA positions within the DLA organizational structure. A recommended organizational structure concludes this section.

Finally, Implementation considerations are discussed in Section 6.



D/DBA ANALYSIS METHODOLOGY
EXHIBIT 1-2

1.3 Scope of Study

In order to understand the impact and direction of the recommendations developed in this report, it is important to clearly recognize the limited scope of this study.

The scope of this study, and consequently the Data/Data Base Administration program, has been limited to the automated data used by DLA. It does not include manual information collected on forms or reported on hand written or typed sheets. The study's principle focus was on managing and administering the DLA Data/Data Base environment.

The reader is cautioned to keep this restriction in mind. This study is not an Information Resource Management (IRM) study. We consider this restriction to be reasonable given the contractual constraints on time and resources. We believe this is an appropriate first step. Our findings and recommendation in this report address the following three questions:

- What D/DBA functions have to be performed to effectively manage the D/DBA environment in DLA?
- What tools are needed to support the D/DBA functions?
- What is the required organizational structure for the functions and tools and where should they be located throughout DLA?

Prior to specifically addressing these questions, we provide some basic principles and concepts for managing a Data/Data Base Environment. This is presented in Section 3.

- IN A WELL-MANAGED DATA-BASE ENVIRONMENT, DATA ARE RECOGNIZED AS AN ORGANIZATION RESOURCE.

  The cost of data is enormous. In order to separate the cost of data from other activities, it should be managed directly and separately from the functions which use those data. Only by this management view can the data resource provide the greatest return on its investment.

- DATA ARE SUFFICIENTLY IMPORTANT, TO MERIT SPECIALIZED AND HIGH-LEVEL MANAGEMENT ATTENTION

  Many DLA organizational elements have data management problems but do not fully understand their extent. To address these problems, a high level of management needs to be involved in the Data Strategy. This includes the perspective from DLA Headquarters as well as from the CDAs and PLFAs organizational levels.

If these Data/Data Base environment principles are merely accepted by top Management and not committed to, the probability of the success of the Data Base environment is greatly diminished.

3.2 The Four Types of Data Base Environment

There are four types of data base environment that are discernable in DLA. Each of these types requires different administrative procedures. The four types have been listed in Exhibit 3-1.

FOUR TYPES OF DATA BASE ENVIRONMENT

TYPE I:	**FILES**
TYPE II:	**APPLICATION DATA BASES**
TYPE III:	**SUBJECT DATA BASES**
TYPE IV:	**MIS DATA BASES**

EXHIBIT 3-1

The first type of data base environment, files, contains applications that utilize sequential files, index sequential files and those applications where a data base management system is not used. Exhibit 3-2 describes TYPE I characteristics in more detail.

TYPE I ENVIRONMENT: FILES

- Separate files of data are used for most applications, designed by the analysts and programmers when the application is created; a data-base management system is not used.
- A large proliferation of files grow up with high redundancy leading to high maintenance costs.
- Seemingly trivial changes to applications trigger a chain reaction of other changes and hence change becomes slow, expensive, and is resisted.
- Example of software: VSAM, BDAM, DMS.

EXHIBIT 3-2

TYPE II ENVIRONMENT: APPLICATION DATA BASES

- A data-base management system is used but without the degree of sharing in a TYPE III environment.
- Separate data bases are designed for separate applications.
- Characteristics: Easier to implement than a Type III environment.
- A large proliferation of data bases grow up with high redundancy like a file environment.
- High maintenance costs.
- Sometimes more expensive than a TYPE I environment.
- Does not achieve the major advantages of data-base operation.
- Examples of software: TOTAL, IMS, IDMS, Honeywell IDS.

EXHIBIT 3-3

The TYPE II environment utilizes data base management system software to implement application systems. These systems may use the DBMS as an access mechanism. The utilization of a DBMS in this way can be ineffective and inefficient. Exhibit 3-3 identifies the characteristics of this data base environment.

The subject data base environment organizes the data by real world entities applicable to the environment. The characteristics of the Subject data base environment are illustrated in Exhibit 3-4.

TYPE III ENVIRONMENT: SUBJECT DATA BASES

- Data-bases are created which are largely independent of specific applications.
- Data-bases are designed and stored independently of the function for which they are used.
- Data for DLA subjects such as customers, vendors or personnel are associated and represented in shared data-bases.
- Examples of software: IMS, IDMS, IDS, ADABAS.
- Characteristics: thorough data analysis and modeling needed, which takes time, much lower maintenance costs.
- Leads eventually (but not immediately) to faster application development and direct user interaction with the data bases.
- Requires a change in traditional systems analysis methods, and in overall DP management.
- If not managed well, it tends to disintegrate into a TYPE II (or sometimes TYPE I) environment.

EXHIBIT 3-4

The TYPE IV data base environment, MIS data bases, supports high level management and decision-support functons and places the power of computers closer to the users. In order to accomplish this in a efficient manner, the data base must be designed to permit what-if type queries. Separate hardware and a DBMS might be required to support the users without impacting the production environment. Exhibit 3-5 lists the characteristics of this data base environment.

TYPE IV ENVIRONMENT: DATA-BASES FOR MANAGEMENT INFORMATION SYSTEMS

- Data-bases organized for searching and fast information retrieval rather than for high-volume production runs.
- Employs software designed around inverted files, inverted lists, or secondary key search methods.
- New data-item types can be added dynamically at any time.
- Good end-user query and report generation facilities.
- Examples of software:
  - -- IBM's STAIRS
  - -- ICL's Content Addressable File Store (CAFS)

EXHIBIT 3-5

3.3 Data Definition

The data manipulated by automated system(s) needs to be uniquely defined and preferably maintained using an automated tool. Automated tools are required because of the vast amount of metadata (data about data) collected in an organization and the need to manipulate the data for reports, queries, and updating. The result of uniquely defining data

is an understanding of the amount of data being collected, where it is being collected and how it is being used.

3.4 Data Standardization

A follow-on activity to data definition is data standardization. This activity identifies duplicate data (synonyms) and data that has the same name but different meanings (homonyms) given by different users. This effort reduces the costs of collecting data because less data would be collected and will be of greater consistency because the source of updates are controlled.

The value of the data will be greater because of its consistency and accuracy. This improves the return on investment the organization makes collecting and storing the data. It also saves time and effort because it does not collect and maintain duplicate data.

3.5 Strategic Data Planning

Strategic data planning is the activity that reviews the enterprise and determines which organizations create and/or use data. Obviously the metadata is of a high level nature and is functionally group together. This planning informs top management of the organizational interrelationships and supports the priority setting activity. In many organizations it is unknown which suborganization is using the data and which suborganization is creating it and takes responsibility to maintain

it. Some organizations may be found to be duplicating efforts, that may need resolution.

Strategic Planning must also consider the future information requirements (based on its Business Plan) of the organization. Information requirements will change as the mission or objectives of the organization change. Changes will be required as the result of changes in governmental regulations and laws. The organization must forecast these changes to anticipate and minimize the scope of change through planning.

3.6 Logical Data Design

It is necessary to develop a logical data model that represents the inherent properties of the data independently of software, hardware, or machine performance considerations. This model presents the data such that it is structured to evolve over time and to minimize the application software changes that may be required. The model is a basis for organizing the data into subject and management information systems.

The logical design is more detailed than the strategic plan, but follows the strategic plan for the breakdown of functional or subject categories. In this way a "thread" may weave from the high levels of data to the detail levels.

This information can be further refined to illustrate the Business Units that affect the enterprises functional workload and support the estimation of computer hardware needed. Business units are key transactions that can be used to forecast the organization's work volume. As the enterprise grows, its computer hardware could be acquired in an orderly fashion. This acquisition would be based on the organizations projected growth (or lack thereof), such that other interested parties (e.g., finance) may base their supporting plans.

3.7 Physical Database Design

The mapping of the data to the hardware/software environment is the function of the physical database design. This includes the physical characteristics of the data, the specific mapping to the data base management system to be used and the access techniques necessary to retrieve and store data. This function is software and hardware dependent.

3.8 Support of Life Cycle Management

Each of these techniques is a step towards automated systems and provides the information required to meet the needs of DoD Life Cycle Management as represented by documentation outlines in DoD standard 7935.

3.9 Automated Tool Support

Large organizations have vast amounts of data that are collected, maintained and used. In order to manage metadata (data about data), automated tools are beginning to be used. This has developed into tools that support a given Life Cycle phase (e.g., data definition, logical data design). The tools include data dictionaries, logical data design and code generators. An organization must invest time evaluating these tools and incorporating their use into their manual procedures. As experience is gained and the tools became integrated, their use will increase and their benefit will rise accordingly.

The selection of automated tools in todays environment is varied, but the tools are designed for specific life cycle phases. An integrated set of tools does not yet exist in the system development environment. There are three phases that trends follow in the data processing industry. In the case of automated software engineering tool support, the following dates have been estimated by industry leaders.

- Phase I - Crisis and Recognition 1980 - 1985
- Phase II - Academic Emphasis 1985 - 2000
- Phase III - Assimilation into Industry 1990 - 2020

Obviously these phases will overlap and may extend more in particular aspects of the industry. A fully integrated set of tools may not exist until the year 2000.

3.9.1 Data Dictionary/Directories

Data dictionaries are the primary tool used by Data/Data Base Administration personnel. They vary widely in their capabilities but support the following purposes.

- Manage metadata

  Metadata (data about data) requires that it be managed like any other resource within an organization. In this way, the organization can determine who is collecting data, maintaining it and using it.

- Central repository of data

  The metadata should be collected by organization elements that collect or use the data. The metadata should be centrally managed and available to the whole organization for reference. This permits the local organizations to refer to the existing metadata for synonyms and/or homonyms that may exist.

  A centralized Data Dictionary permits DLA Headquarters to control updates and resolve errors. This is supported by the fact that there are not multiple DD/D databases that require consistency checks or require multiple updates.

- Enforce Standards

  Data Dictionaries produce reports to support the enforcement of standards. Duplicate data objects or characteristics of data objects can be identified and flagged before they are updated. The DD/D updates themselves can be limited to selected users.

  Data characteristics can be composed during design, implementation, and operation of a computer system ensuring that proper characteristics (e.g., codes) are being used. The enforcement of standards reduces the amount of updating required, reduces the maintenance of data and permits the interfacing or communication of data among different functional application systems.

- Support Control of Change

  During the life cycle of a system from design to maintenance, Configuration Management impact analysis must be performed before actual changes are made. In this way the number of changes can be anticipated including an estimation of the resources required. A Data Dictionary/Directory can support the impact analysis with a query capability and/or standard reports. The information provided these reports will allow informed management decisions.

- Support the Analytical Process

  The Data Dictionary/Directory provides reports of the analysis stat .s and provides documentation of the analysis.

  The DD/D should support a quality assurance function. This is accomplished by reports where relationships, descriptions or other characteristics are identified as missing. The reports should be capable of providing a top-down or a bottom-up view. Where necessary references to manual documentation and/or system requirements can be provided to assist the quality assurance effort.

  Documentation is capable of being presented according to the intended audience. Information to the analysts and operational users (acting as reviewers) may contain greater detail as compared to reports for higher level managers. Flexibility is a key capability needed to focus the required information in a preferred format for discussion/review.

Data Dictionary/Directories are one of two types; Passive or Active. Passive DD/Ds are stand alone systems that may or may not be dependent on a Data Base Management System (DBMS). In either case, metadata is captured and stored for most methodologies and DBMSs. Passive DD/Ds can be manual (e.g., card index), automated and developed in-house (e.g., DLA MSS) or a commercial package (e.g., PSL/PSA).

Active DD/Ds are not active per se, but are highly coupled with a given DBMS. The DD/D provides the schemas and subschemas for compilation by the DBMS. Some DD/Ds will also provide the data definition to language compilers at compilation time for programmers. In this way the

DD/D has greater control regarding the changes to both schemas and data definitions (i.e., the changes must be made through the data dictionary). The changes are automatically provided to the application programs. Features of passive and active DD/D are discussed in detail in Section 4.

3.9.2 Bridges to Other Automated Tools

The effectiveness of automated tools is greatly enhanced when the data can be transferred electronically (e.g., telecommunications, magnetic tape, disk). In this way the data can be manipulated by humans through multiple software packages. As data is transferred from one process to another, quality assurance checks and audit trails can be executed and confirmed. Due to the volume of data, the quality assurance procedures would probably not be executed in a manual mode considering the amount of time required to complete the task. Bridges provide the means to integrate stand alone tools to support the full system life cycle.

3.9.3 Other Support Tools

In this section we discuss other tools that support the D/DBA area. Unfortunately, some of these tools are integrated together and others are highly coupled. This implies that certain products are capable of executing with a given DBMS, specific hardware family, or require unique data formats. These tools are presented by the D/DBA areas:

- Logical Data Modeling

  There are automated tools that input the data relationships (preferably through a bridge with a data dictionary) and synthesizes the optimal third-normal-form structures, documents the structures and assists with data base design. The output also serves as a corporate-wide data model.

- Physical Database Design

  Some DBMS products offer a tool to assist in selecting access methods, determining hardware requirements and physical data layout. These tools assist the data base designer to develop the optimum data base design.

- Machine Performance

  There are a number of products available that measure the CPU utilization, memory usage, channel and access mechanisms. These products are designed for specific computer families and may not be available for some computers. The computer manufacturer or an independent vendor could supply these measurement products.

  There is another set of products, referred to as monitoring aids that measure input volumes from end users (i.e., Business Units), types of transactions, response times and rates of growth. The DLA ORACLE project is working towards one such product. Prototyping of software also would provide similar information that would affect the design of the actual software. Prototyping tools are based on very high level languages and can be configured to emulate the proposed software environment.

Since the automated tools are usually stand alone packages, the Database Administrator may have to sponsor the development of specific bridges for the tools he has acquired.

SECTION 4. GENERAL DESIGN FRAMEWORK

In the previous sections we provided a brief summary of DLA's current D/DBA administration environment. We highlighted key findings and issues relative to that environment. We also indicated some basic principles for effectively managing a D/DBA environment.

In this section we will describe a general design framework for establishing an effective D/DBA administration program. This design framework has three dimensions.

- What functions have to be performed to effectively manage the D/DBA environment in DLA?
- What tools are needed to support the functions?
- Where should the functions and tools be located throughout DLA?

These dimensions support the three primary data representations outlined in Exhibit 4-1. The Logical Model represents data as viewed by management. At its composite level (i.e., data entities) and at the lower levels as viewed by users (e.g., elements). The software schemas represent the relationships among the data entities. Physical Data Base design includes the physical mapping of the data and the associated overhead to a particular DBMS.

Subsequent paragraphs discuss the required functions and tools while Section 5 discusses the proposed organizational structure.

4.1 Required D/DBA Functions

There are five major functions that should exist in an organizations' Data/Data Base Administration environment. In some organizations these functions may be combined and performed by one individual primarily depending on the organization size and disbursement of business functions. These are:

- Data Strategy Planning
- Data Administration
- Data Base Administration and Design
- Data Distribution Administration
- Auditing and Security.

Each of these major functions contributes to the overall Data/Data Base Administration effort. The following sections explain the individual functions in detail and provide insight on how they interface.

4.1.1 Strategic Data Planning

The purpose of this function is to develop a corporate view of data considering how data is used today and how it should be used tomorrow. In order to accomplish these tasks the individual performing this task must work both with the functional user management, data processing management, and corporate management. This responsibility requires that the data strategy function educate the functional and corporate managers as to the importance of data planning and to emphasize the benefits to all participants.

STABILITY ANALYSIS STEPS

1. Confirmation of Associations (relationships) among data entities. The associations include one to one, one to many and many to many relationships.

2. Confirmation of Data element identification and definition with users to ensure that standards are being followed and that all appropriate users have had an opportunity to participate.

3. Determination whether data elements may become a key in the future. Industry trends may require that users view data differently then today.

4. Confirm whether identified keys are accurately stated.

5. Determine the cardinality of each Association by review with users and comparison with existing systems.

6. Identify the usage path and the expected volumes (i.e., low, high, mean). Identified Business Units will provide the expected volumes across future time periods.

7. Compare usage path volumes and determine whether expected response will be acceptable, depending on the audience of the system and the level of organization it supports.

EXHIBIT 4-9

CANONICAL SYNTHESIS STEPS

1. User views, or subschemas are extracted from the functional requirements in a form amendable for further manipulation. In general, the important user view information to be extracted include:

   - Primary key items
   - Secondary key items
   - Concatenated primary keys
   - Functional dependencies among items.

2. A validation of user view data against the data dictionary are made in order to ensure that correct element and view names and descriptors have been extracted.

3. An automated package (e.g., Data Designer) or a manual process will next combine the set of user views using the process of canonical synthesis.

   Basically, this process involves a three step normalization process:

   - **First Normal Form:** Internal repeating groups are removed
   - **Second Normal Form:** All improper functional dependencies between keys and attributes are removed
   - **Third Normal Form:** All improper functional dependencies between non-key attributes are removed.

   The end result of the normalization process is a non-redundant data structure, free of transitive dependencies.

4. Following the generation of a canonical form logical data base design, it is important that it be reviewed carefully with the functional proponents and evaluated for consistency with the baseline Functional Definition requirements. The iterative design process may then continue by once again using an automated tool or the manual algorithms to generate a new logical data base design.

5. The final steps, following the synthesis of the optimal data base design, will be the integration of the design parameters into the functional documentation.

EXHIBIT 4-8

Exhibit 4-8 documents the steps involved in Canonical Synthesis.

4.1.2.5 Coexistence Design

A determination must be made as to which data should remain in sequential files, application data bases (TYPE II) and those that should be converted to Subject Data bases (TYPE III). The planning and timing of any conversions should be calculated and coordinated with the Data Base Administrators/Designers, user group(s) and management.

4.1.2.6 Stability Analysis

This function is responsible for determining whether the data model reflects our current environment and if it will address any future requirements that we can identify today. The importance of this function is to refine the data model such that application programs can be developed that assume the data model truly reflects user requirements. Exhibit 4-9 identifies the steps for Stability Analysis.

The selection of a passive or active Data Dictionary depends on the organization environment and its future plans. The Data Strategist and Data Base Administrator/Designer should participate on the decision on the choice of software. Exhibit 4-7 lists some considerations that should be addressed.

DD/D SELECTION CONSIDERATIONS

- Choice of dictionary presents problems in a multiple DBMS environment
- Usually a compromise is to use the dictionary of the most widely used DBMS (such as TIS in DLA)
- Choice of dictionary and the facilities which link to it need to be a part of the Strategic Top-Down Data Planning

EXHIBIT 4-7

4.1.2.4 *Canonical Synthesis*

This function creates independent Data Models of application systems. It is important that the physical design be built on a logical foundation to meet the user requirements for data access. This will minimize the impact to the data base structure resulting from changes in the organization.

Data Base Management System technology has received a poor review because organizations have not received the expected benefits from them. In some cases, any of the performance/cost benefits have been worse than sequential files. This was the result of poorly coupled data and its dependency on applications.

- Passive DD/D Features

- Supports Definition of all types of data items, data grouping, and data associations.

- Permits Aliases (Synonyms) to be recorded, and indicates where one data item is really the same as another which (for historical reasons) may be represented differently.

- Permits homonyms to be recorded (different data items that have been given the same name on different projects) and indicates on which projects they are used.

- Provides support for different types of DBMS so that a multiple-DBMS environment can be supported.

- Supports the definition of process entities (e.g., systems, programs, modules, projects, transactions)

- Supports the definition of usage entities (e.g., users, terminal, department, company)

- Prints attractively formatted, easily comprehensible reports of all aspects of dictionary usage.

- Provides KWIC (key word in context) indices to help in searching for information in the dictionary.

- Supports the definition of security levels and authorization details.

- Supports distributed data-base systems, showing what data are kept at each location, and what type of distribution is used (e.g., replicated data, partitioned data)

EXHIBIT 4-6

"Active" DD/D Features

- Enforces the use of data definitions that are in the dictionary
- Selective Enforcement; Enforces the use of dictionary definitions for some projects and not others
- Automatically converts data items to the same formats before adding or otherwise manipulating them in combination
- Sharing of dictionary and DBMS tables for operational efficiency
- Integration of the dictionary with the DBMS user languages and sometimes direct interaction with the language user
- Used in the interpreter or compiler of database languages
- Inserts labels of data items, columns, or chart axes into reports generated by users
- Enforcement of auditor's rules
- Support the distribution of data which enables one machine to locate and utilize data that reside in different machines

EXHIBIT 4-5

4.1.2.3.1 Selection of Data Dictionary/Directory Software

Obviously, the DD/D software will have to be executed on the available hardware and both the hardware and software should be configured to handle the expected volumes. If the organization is dispersed throughout the country, multiple software configurations may be required; one for each location. Procedures would be developed to transfer metadata to the various sites. Audits would be necessary to ensure maintenance compliance.

Probably the most important decision to be made is whether the DD/D should be an Active DD/D or a Passive DD/D. An Active DD/D is usually highly coupled with a Data Base Management System. Its advantages include the enforcement of standards and the automatic interfacing between the DBMS and the DD/D. The features of an Active DD/D are illustrated in Exhibit 4-5.

A passive DD/D is a stand alone package that is not highly coupled with a DBMS, but supports the methodology(ies) used in an organization and provides the necessary analytical and documentation reports. The features of a Passive DD/D are included in Exhibit 4-6.

The data element standards must be developed from a corporate perspective and distributed throughout the organization. These should be reviewed by all Data Administrators every few years. In this way, there should be little disagreement over the standards selected and they should be adhered to.

If the situation regarding a data element identification involves synonyms and/or homonyms and it cannot be resolved at the lower organization levels; the corporate Data Administrator will have the authority to determine the final outcome. The various parties should be encouraged to resolve the situation.

4.1.2.3 Maintenance of Data Dictionary/Directory(ies)

The Data Administration function is responsible for the following activities regarding Data Dictionary/Directories:

- Selection of Data Dictionary/Directory software
- Manage the operation and maintenance of the DD/D software,
- Develop and manage "bridges" between DD/D in different locations and among different automated tools (e.g., DD/Ds and logical design tools)
- Develop and audit compliance of DD/D usage and reference by all parties involved
- Develop procedures and forms for the gathering of metadata and its report generation.

These activities are discussed in detail below:

4.1.2.1 Logical Data Modeling and Validation

This function is responsible for the data organization reflecting its inherent nature. This organization takes into account individual functions and subject area factors. The Data Administrator works very closely with the Data Strategist in developing these models to ensure that the high level view is consistent with the organizations long term plans. The logical data model is independent of any hardware or software. The Data Strategist will provide and coordinate input to the Data Administration function.

4.1.2.2 Data Element Analysis and Standardization

This function is responsible for the identification and definition of data elements and their logical grouping. Data element definition will occur with the Data Administrators located with the design agencies. During this process, the design agency Data Administrator will reference existing data element standards.

The Data Administrator for the headquarters organization will review the data elements being identified to ensure that synonyms and homonyms are eliminated. Synonyms are data elements that have different names but the same meaning. Homonyms are data elements that have different meanings but the same name. Also as part of this function, the Data Administrator will review data element definitions to ensure consistency with applicable standards (e.g., naming conventions).

DATA ADMINISTRATION FUNCTION

- Logical Data Modeling and Validation
  - Individual Functional or Subject Area Perspectives
- Data Element Analysis and Standardization
  - Identify Data Element Definitions and Naming Conventions (e.g., Synonyms)
  - Standardize as appropriate
- Maintenance of Data Dictionary/Directory(ies)
- Canonical Synthesis
  - Creates software independent data model(s)
  - Describes the inherent nature of the data
  - Third normal form
- Coexistence Design
  - Determines whether 'flat' files or application data bases should be converted to subject data bases
  - Plans the bridge for the conversion
- Stability Analysis
  - Forces the organization to think about past and future uses of data
- Selection of Data Dictionary/Directory and Logical Data Modeling Tools
- Development of Automated Support Standards

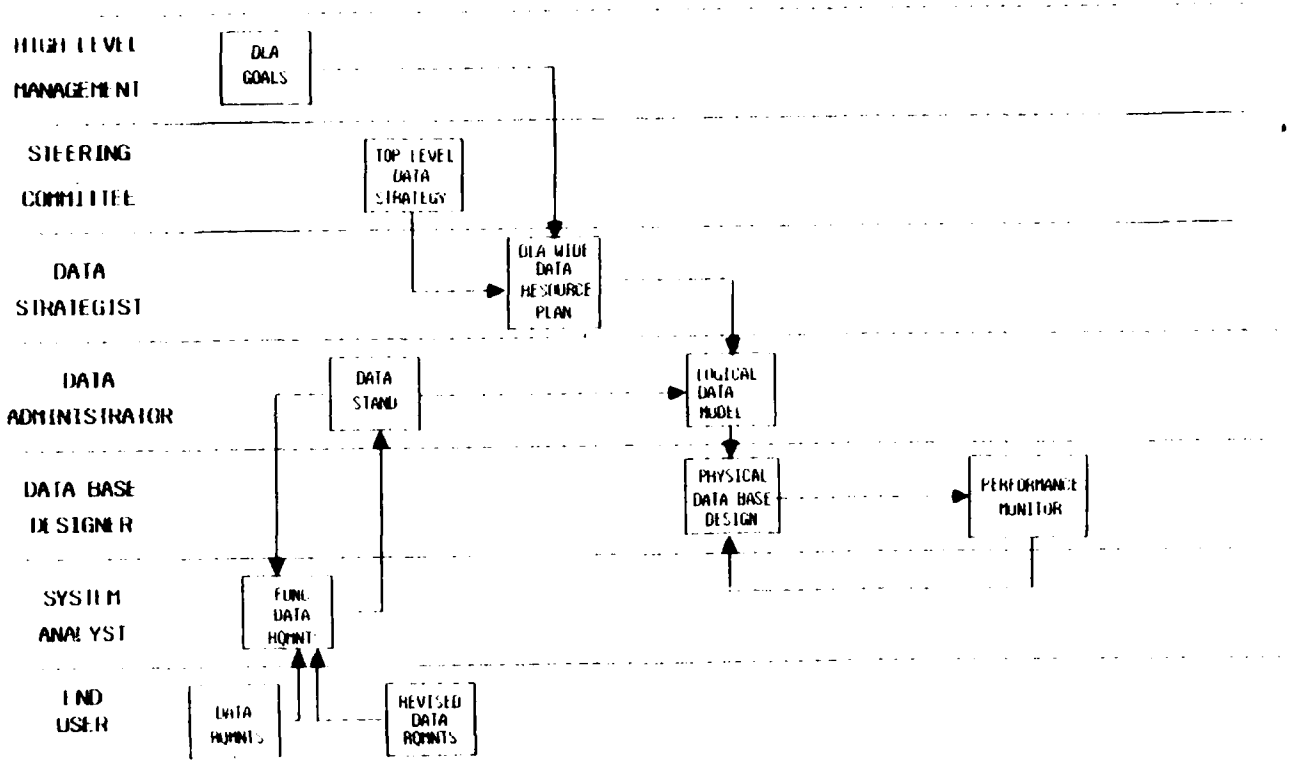
EXHIBIT 4-4

DATA STRATEGY PLANNING FUNCTION

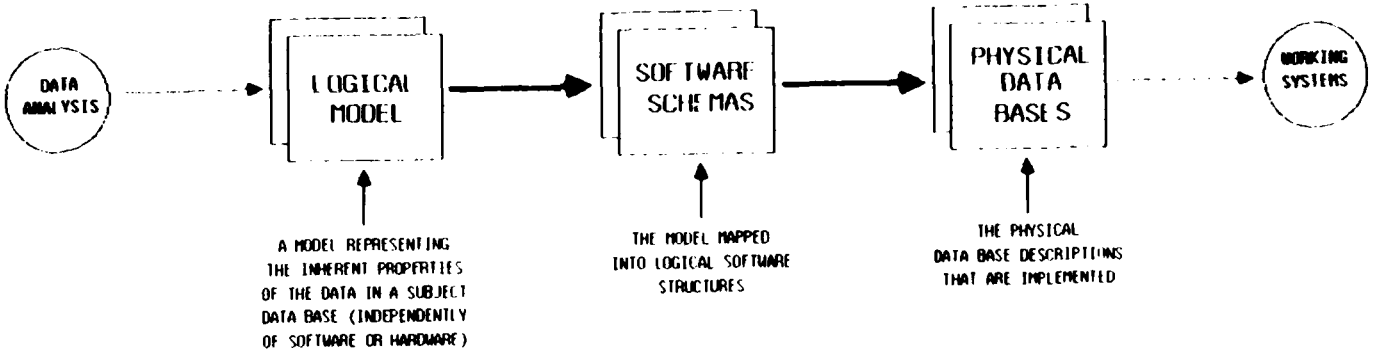
- DLA Wide Planning Data
  - High Level View - Enterprise Model
  - Functional Area Views
  - DLA Wide Data Resource Plan
  - Identifies who are the 'Owners' of data and who are the 'Users' of data
- Assessment of Future Information Requirements
  - Development of an Entity-Relationship Overview Chart
  - Clustering Entities into Subject Data Bases
  - Provides an Independent View of How Existing Systems Interact with the Business Functions
  - Identifies what Data is Utilized by Which Systems
- Handling of Human and Political Problems in the Establishment of Common Data Throughout the Enterprise DLA
- Education of top management in the need for strategic planning of data and enforcement of common data definitions and models
- Requires a high level steering committee and a separate data strategist position.
- Performs DLA Wide data planning
- Assesses DLA future information requirements
- Develops an entity-relationship overview chart for DLA
- Clusters Entities into special data bases
- Handles human and political problems in the establishment of common data throughout DLA

EXHIBIT 4-3

TOP LEVEL DATA PLANNING DIRECTS THE
DATA BASE DEVELOPMENT PROCESS



(EXHIBIT 4-2.)


DATA ANALYSIS
LOGICAL MODEL
SOFTWARE SCHEMAS
PHYSICAL DATA BASES
WORKING SYSTEMS
A MODEL REPRESENTING THE INHERENT PROPERTIES OF THE DATA IN A SUBJECT DATA BASE (INDEPENDENTLY OF SOFTWARE OR HARDWARE)
THE MODEL MAPPED INTO LOGICAL SOFTWARE STRUCTURES
THE PHYSICAL DATA BASE DESCRIPTIONS THAT ARE IMPLEMENTED

(EXHIBIT 4-1.)

This function is very political in many respects, having to seek the cooperation of functional and corporate managers while "teaching" them how their business operates. Many of these managers would be justifiably insulted if some people thought that they did not know their business. It would be very helpful to this function, if the Data Strategist reported to the chief organization officer. This would provide the "Top Management" backing to effectively implement this function.

Once the Strategic Data Model has been developed, it feeds the Logical Data Model and Physical Data Model development. Exhibit 4-2 illustrates the relationship between the Strategic Data Model and subsequent data models.

Exhibit 4-3 presents the overall Strategic Planning function.

4.1.2 Data Administration

Data Administration is responsible for the designing of data models for the organization. The data models are relevant to the specific organization levels for which they were developed. This involves the coordination amongst the various levels of the organization and a set of procedures to bridge the data among the tools supporting the Data Administrators

Exhibit 4-4 illustrates the Data Administration functions. These are discussed in detail below.

4.1.2.7 Development of Automated Support Standards

To effectively utilize the automated tools in the Data Administration function, standards must be designed to interface the organization methodologies with the tools. In this way the metadata will be collected, coded and reported consistently regardless of the application or location. The standards should be developed by a central headquarters group and used by all Data Administrators throughout the organization. The headquarters Data Administration group should conduct periodic reviews and audits to ensure that the standards are being followed. Exhibit 4-10 identifies areas of standards that should be developed.

AREAS OF AUTOMATED SUPPORT AREAS

- Naming Conventions
- Standard Abbreviations and Acronyms
- Relationship Utilization
- Bridge Formats and Standards
- Report and Report Parameter Utilization
- Data Entry
- Quality Assurance
- Backup
- MetaData Distribution
- Synonym and Homonym Discrepancy Resolution

EXHIBIT 4-10

Although these standards should be centrally controlled, suggestions for change should be encouraged from the field and seriously considered by management; all suggestions should be formally responded within thirty days as to its acceptance, rejection, and/or current consideration.

4.1.3 Data Base Administration/Design

The Data Base Administrative/Design function is responsible for the physical design of data bases, Data Base Management System(s) and its environment. In many respects this function has greater technical aspects than does the Data Administration function.

The Data Base Administration function must coordinate with the Data Administration function regarding the transition between the logical data model and the physical data model. In addition, Data Base Administration will have to deal with the programming staff regarding the data base design, access techniques and appropriate standards. Exhibit 4-11 identifies the Data Base Administration/Design Functions. These functions are discussed in detail below.

4.1.3.1 Data Base Software Evaluation and Selection

The selection of Data Base Management System software is a difficult decision because:

- Its a major investment in terms of system support
- Staff training is more complex

Whatever DBMSs are chosen, it is best to minimize the number of packages operational within the organization. Exhibit 4-12 lists reasons why the fewer DBMSs within an organization are to its advantage.

DATA BASE ADMINISTRATION/DESIGN FUNCTIONS

- Data-Base Software Evaluation and Selection
- Determine Data-Base Standards and Design Techniques
- Design of Data Base Schemas
  - Uses Logical Data Models as Input
  - Uses Automated Data Dictionary
- Physical Data Design
- Independent File Design
- System Integrity/Recovery Planning
- Performance Analysis
- Data Base Conversion Planning
- Software development is more complex
- Ability to support the long term organizational requirements requires more planning
- Different DBMSs are best suited to specific application types.
- Data Base Software Evaluation and Selection
- Determine Data Base Standards and Design Techniques
- Design of Data Base Schemas
  - Uses Logical Data Models as Input
  - Uses Automated Data Dictionary
- Physical Data Base Design

EXHIBIT 4-11

DATA BASE ADMINISTRATION/DESIGN FUNCTIONS

- Independent File Design
- System Integrity/Recovery Planning
- Performance Analysis
- Data Base Conversion Planning

EXHIBIT 4-11 (continued)

Advantages to Fewer Operational DBMSs in an Organization

- Less DBMS software maintenance
- Fewer standards to be developed, maintained or need enforcement
- The amount of training and cross training of personnel that is required
- Fewer data manipulation routines that have to be developed and maintained
- Greater control of data with data dictionary Support

EXHIBIT 4-12

More than one DBMS may be required to support an organization depending on user requirements. Operational users may require the ability to select a customers record very quickly; while higher management may require a sophisticated query capability to analyze trends. Exhibit 4-13 illustrates information characteristics by Area of Management decision.

In order to provide for expected response times from the variety of users, it may be necessary to locate the data on a separate hardware configuration. The analysis to determine the location(s) of data should be performed by the Data Distribution function described below in this document.

ADP CAPABILITY BY MANAGEMENT AREA

Data Characteristic	Strategic Planning	Management Control	Operational Control
Accuracy	Low	_____	High
Level of detail	Aggregate	_____	Detailed
Time horizon	Future	_____	Present
Frequency of use	Infrequent	_____	Frequent
Source	External	_____	Internal
Scope of information	Wide	_____	Narrow
Type of information	Qualitative	_____	Quantitative
Age of information	Older	_____	Current
ADP Capability			
Scheduled demand	SLOW-REACTION INFORMATION SYSTEM	COMPLEX OFF-LINE QUERIES	PRODUCTION DATA PROCESSING
Unscheduled demand	GENERALIZED INFORMATION SYSTEM	COMPLEX ON-LINE QUERIES	SIMPLE QUERIES

EXHIBIT 4-13

4.1.3.2 Data Base Standards and Design Techniques

This function is responsible for establishing standards relating to the DBMS(s) selected for the organization. Standards must be developed for updating data base records, recovery, and access strategies. Design techniques will require standards to ensure the integrity of the operational data bases.

4.1.3.3 Design of Data Base Schemas

Once the logical data model has been created, it is necessary to create a logical schema model. The logical schema model is independent of the DBMS or other software considerations.

Data Base Schemas are represented using Entity Modeling. An entity is a real world object (e.g., person, place or thing) which we store data. In the DLA environment an materiel item is an entity. Entities are described by their attributes (i.e., data elements). Each attribute is given a name and description. Attributes may be identified as the "key" or primary index for an entity. If an attribute is not "key" it must be dependent on a key.

Entities are associated with one another by relationships. The relationships are provided names which may indicate some meaning and/or the directionality of the relationship.

There are other characteristics identified to relationships among entities. They include:

- Associativity/Exclusivity - indicates the degree of association (e.g., one to many, one to one, many to one, many to many) between objects. The Associativity may also be expressed as a cardinality (e.g., 1:3, 10:10).
- Optional - The entity may have an optional existence and if an entity did not exist, the relationship would not exist.
- Contingent - The existence of an entity is dependent on the relationship.
- Conditional - The existence of one of the entities is dependent on a outside factor.
- Mandatory - The existence of the entities is mandatory.
- Environmental constraints - The relationships may be restricted further by outside (environmental) factors.

The logical data design could be considered complete upon the identification of the entity-relationship model. Many data dictionaries

permit the analyst to manipulate the entities and relationships with greater efficiency and effectiveness.

4.1.3.4 Physical Data Base Design

This function is responsible for the actual Data Base design considering the hardware and software characteristics. During this activity the logical data base schema is translated into the data definition language of the DBMS being used. The following steps are used to develop the physical design.

- Physical record format - This activity addresses the requirements of redundancy, derived versus explicitly stored values, and data compression.

- Physical Record Clustering - This activity is responsible for determining the allocation of different record types into physical clusters to take advantage of the disk read/write characteristics, (e.g. via relationship of CODASYL databases).

  The mapping of physical records to blocks is also determined during this activity. A physical block is a fixed amount (the amount may vary by manufacturer) of information read or written with each input/output request.

- Develop Access Method Techniques - This activity is responsible for developing access techniques for application searches. Most searches will be on the identified keys (in the logical schema) to find the physical records. There is DBMS overhead with any physical structure, therefore it is a prime objective to minimize this overhead while achieving the required access paths.

- DBMS Routine Program Design - In order to reduce initial programming costs and subsequent maintenance, standard DBMS routines should be design for the access paths identified above. During this phase design decisions must be made regarding buffer areas and operating system parameters. These are hardware specific decisions and cannot be generally stated.

4.1.3.5 Independent File Design

Independent file design consists of those activities that are necessary to develop a physical record layout for sequential files and the physical characteristics of the file itself. Record layout design is composed of the activities of Data Item Representation and Compression.

The Data Item Representation techniques usually found on most machines are:

- Position - Fixed length fields for item values that permits efficient software and unused storage space.
- Relational - Substitutes a special character for a string of blanks. Associated with the special character is a cardinality representing a repetitive factor. This approach assumes that the special character will not be elsewhere in the data file.
- Index - This type of representation may take various forms. The Index may contain the starting location of a field or may indicate whether the field values are present or not.
- Labelled - Each field value is preceded by the field's name. The fields may be in any order and if there is no value, there will be no associated name.
- Free-format - The fields are separated by a special character (e.g., a comma). If there is no value for the field, two separator characters are concatenated together.

Compression is a method for conserving space on secondary storage. Compression techniques include:

- Abbreviations - These permit the substitution of a few characters for many (e.g., NY for New York). Depending on the number of values and functional objectives, this translation may be done manually or via automated mechanisms.

- Null suppression - This technique is used to suppress blanks and zeros in data files that contain a relatively large number of this type of data.
- Pattern Substitution - Provides for the selection of one character for many characters in a file. Obviously the substitution must be consistent throughout the file.

Independent file design also includes the determination of the following factors:

- Type of Application - An indication of online/offline, retrieval only or update and retrieval or sequential/random processing.
- Sort Order - Sorting of records may be avoided if the file is sorted.
- Blocking Factor - Depending on the availability of memory, greater input/output accesses can be reduced to meet a particular projects requirements.
- File Size - The cardinality of records will affect processing and performance.
- Loading Factor - Plans ahead for growth of the file; permits a smooth transition if a data file reorganization takes place.
- Search Mechanism - Whether most reports and/or updates are to individual records or multiple records at one time.

The activities to accomplish independent file design are similar to those of a Data Base Management System. They are not crucial in a sequential environment, but if not performed property will cause unnecessary burdens on the computer hardware.

4.1.3.6 System Integrity/Recovery Planning

The Data Base designer must provide for the planning of the integrity of the data base to ensure that the data collected has value to the

INTEGRITY PROBLEMS

- Field Definition - Various parts of an organization have different definitions (hononyms) regarding the same data or have different names, but have the same meanings (synonyms).
- Field Structure - The characteristics (e.g., size, codes) of a data field varies within the organization.
- Record Structure - Records identified with the same key have different attributes within the organization.
- Update Intervals - The updating frequencies (e.g., weekly) differ within the organization, therefore managers cannot understand the discrepancy in the data values.

EXHIBIT 4-14

organization. Exhibit 4-14 illustrates the areas that integrity problems may arise and devalue the data collected.

Recovery Planning includes the source of information to be used to recreate a data base if damage has occurred to it. The recovery procedures must be concise and have been tested to ensure they work properly.

4.1.3.7 Performance Planning

In many hardware environments, there are tools to measure the performance of a hardware/software environment. These usually identify bottlenecks and provide data to predict performance. Measurement tools focus their attention to the central processing unit, memory utilization, channel utilization and access mechanisms. The results must be interpretation by trained personnel. It is difficult to predict the

performance of a application software due to "outside" factors such as operating system overhead and limitations of hardware. At best these models permit the simulation of software varying parameters that may affect the system. They also suggest when the hardware may need to be upgraded.

4.1.3.8 Data Base Conversion Planning

This function provides the strategy and plans for converting:

- Sequential files to a data base structure.
- Application data bases to subject data bases.
- Sequential files, application or subject data bases to MIS data bases.

Every situation must be considered on its own merits, whether a DBMS will provide the expected benefits. If the decision is positive, the conversion of one type to another must to planned such that users are not impacted. In performing a conversion the factors in Exhibit 4-15 must be included in the planning.

4.1.4 Data Distribution Administration

In many large, geographically dispersed organizations, such as DLA, it is necessary to determine the optimum location of the data. This decision is complicated by the purpose of each system (e.g., management information system, production system) and its data characteristics (Exhibit 4-13).

The Data Distribution Administration function is responsible for determining the location of each system, its data requirements (in conjunction with the Data Administrator), whether data should be duplicated and if so, its updating requirements, and how should the data integrity be maintained. The Data Distribution Administration function must utilize a common data model and a common data dictionary. Telecommunications network design and network workload forecasting are functions that must interact with the Data Distribution function to ensure that the telecommunications capability will have the proper capacity.

In some organizations, the Data Distribution Administration function is incorporated into the Data Administration function depending on the number of locations and whether the organization is in a implementating stage of development or a maintenance stage.

4.1.5 Auditing and Security

Security has been referred to the protection of resources from damage and the protection of resources from change and the protection of data against accidental or intentional disclosure to unauthorized persons or unauthorized modifications or destruction. In the DLA environment security it is vital to the process of its mission.

The security function is responsible for planning and implementing the policy and procedures necessary to protect the DLA mission and its

investment in information. There are three areas that security must address:

- Security Authorization
- Address Security Breaches
- Security Audits

Security authorization is responsible for permitting the proper individuals access to required information and securing the data from all other individuals. Access to data refers to obtaining, modifying, or updating via computers.

The management of Security Breaches includes the methods of detection and the investigation of known security breaches. Each instance should be handled according to the established policy and procedure.

Security Audits are a function that will improve the organizations awareness of security. Audits should be performed randomly and pre-scheduled at each site to identify potential weaknesses and areas that may need improvement.

DATA BASE CONVERSION FACTORS

1. A mapping of the data from one file type needs to be made with consideration to physical storage, changes in permissible values, and identification of keys.

2. Audit trails must be planned and implemented during actual conversion.

3. The programming (if required) and testing of software to transfer the data from one file type to another. Application software will need to be tested to ensure that it can read the resultant data files.

4. Additional computer power may be required to perform the conversion without impacting current production support.

5. The timing must consider other organizational requirements (e.g., end of year processing)

6. Parallel testing if applicable, of the current system with the resultant system should be planned and implemented.

EXHIBIT 4-15

POSITION: DATA-DISTRIBUTOR

LOCATION	ADVANTAGES	DISADVANTAGES
HEADQUARTERS, DLA-ZW	• COMPATIBLE WITH SOME CURRENT MISSION STATEMENTS • NOT DIRECTLY DISTRACTED BY AIS PRESSURES	• STAFF MAY BE LACKING PROPER SKILLS • MAY REQUIRE ADDITIONAL STAFFING
HEADQUARTERS, DLA-ZS	• POTENTIAL FOR TIES ACROSS AIS SYSTEMS	• NOT FULLY COMPATIBLE WITH CURRENT MISSION STATEMENT • NEW FUNCTION MAY BE OBSCURED BY AIS PRESSURES • MAY REQUIRE ADDITIONAL STAFFING

EXHIBIT 5-6

POSITION: SECURITY OFFICER

LOCATION	ADVANTAGES	DISADVANTAGES
HEADQUARTERS, DLA-ZW AND AT EACH CDA AND PLFA	• COMPATIBLE WITH CURRENT MISSION STATEMENT • GIVES GREATER VISIBILITY TO A HIGHLY SENSITIVE AREA • MORE DIRECT FOCUS SECURITY AND AUDITING FUNCTIONS	• MAY REQUIRE ADDITIONAL STAFFING • POTENTIAL OVERLAP WITH DLA-T

EXHIBIT 5-7

POSITION: DATA-BASE ADMINISTRATOR/DESIGNER

LOCATION	ADVANTAGES	DISADVANTAGES
HEADQUARTERS, DLA-ZW (DATA BASE MANAGEMENT SYSTEM ADMINISTRATOR)	• GENERALLY COMPATIBLE WITH CURRENT MISSION STATEMENT • PROVIDES FOR FOCUS ON PHYSICAL DATA BASE DESIGN TECHNOLOGY • PROVIDES FOR CENTRALIZED COORDINATION AND GUIDANCE ON STANDARDIZING DBMS SELECTION	• ACQUIRES ADDITIONAL SKILLS/TRAINING
CDA (DATA BASE DESIGNER)	• COMPATIBLE WITH CURRENT MISSION • PROVIDES FOR CLEAR FOCUS ON DATA BASE DESIGN AND IMPLEMENTATION FUNCTION	• ADDITIONAL SKILLS/ TRAINING REQUIRED
PLFA (DATA BASE DESIGNER)	• KNOWLEDGE OF UAIS IMPLEMENTATIONS • PROVIDES FOR CLEAR FOCUS ON DATA BASE DESIGN AND IMPLEMENTATION FUNCTION	• POTENTIAL LACK OF PROPER SKILLS • MAY REQUIRE ADDITIONAL STAFFING AT SOME SITES

EXHIBIT 5-5

POSITION: DATA ADMINISTRATOR (CONTINUED)

LOCATION	ADVANTAGES	DISADVANTAGES
HEADQUARTERS PERFORMED BY AIS ADMINISTRATORS (DLA-ZS)	• METADATA IS COLLECTED DURING ANALYSIS PHASE	• POTENTIAL FOR LIMITED FUNCTIONAL AREA INVOLVEMENT
	• AIS ADMINISTRATOR SYSTEM KNOWLEDGE	• TRAINING
HEADQUARTERS CREATE DATA ADMINISTRATOR FUNCTION UNDER AIS ADMINISTRATOR (DLA-ZS)	• DATA ADMINISTRATOR WORKS CLOSELY WITH AIS ADMINISTRATOR AND FUNCTIONAL USERS	• POTENTIAL MANPOWER CEILING LIMITATIONS
	• PROVIDES ASSISTANCE TO AIS ADMINISTRATOR	• POTENTIAL FOR LESS ATTENTION DUE TO AIS DEMANDS/WORKLOADS

EXHIBIT 5-4 (continued)

5.5 DBMS Security Officer

This position is responsible for the security/privacy issues related to data and data base management systems. There should be a representative at each level of the organization. Exhibit 5-7 presents the advantages/disadvantages of the DBMS Security Officer.

POSITION: DATA ADMINISTRATOR

LOCATION	ADVANTAGES	DISADVANTAGES
HEADQUARTERS, ONE IN EACH MAJOR FUNCTIONAL AREA (e.g., DLA-K, DLA-O)	• HIGH FUNCTIONAL USER SUPPORT, WORK CLOSELY WITH END USERS	• DATA SHARING ACROSS SEVERAL FUNCTIONAL AREAS WILL REQUIRE INTENSIVE COORDINATION
	• BETTER FUNCTIONAL PARTICIPATION IN DATA PLANNING	• HIGH NEED FOR ADDITIONAL SKILLS/ TRAINING
	• MINIMIZES COMPLEXITY- MULTIPLE DAS EACH HANDLING DIFFERENT SUBJECT AREAS	• MAY REQUIRE ADDITIONAL STAFFING
HEADQUARTERS, ONE IN EACH FUNCTIONAL AREA WITH MINIMUM DATA SHARING OUTSIDE THE AREA; ONE IN DLA-ZS FOR MULTIPLE FUNCTIONAL AREAS WITH HIGH LEVEL OF DATA SHARING	• RETAINS FAIRLY HIGH FUNCTIONAL USER SUPPORT	• POTENTIAL FOR BEING OBSCURED BY AIS PRESSURES
	• CONTINUES PARTICIPATION IN LOGICAL DATA MODELING	• NEED FOR ADDITIONAL SKILLS/TRAINING
	• REDUCES COMPLEXITY AND INTENSIVE COORDINATION	• MAY REQUIRE ADDITIONAL STAFFING
CDA'S AND PLFA'S-- ONE PER SITE	• FUNCTIONAL RELATIONSHIP FROM FIELD TO HQ	• MAY REQUIRE ADDITIONAL STAFFING
	• PROVIDES FOR LOGICAL DATA MODELING FOR UAIS DATA FOCUS	• NEED FOR ADDITIONAL TRAINING
	• TOP LEVEL DATA FOCUS	

EXHIBIT 5-4

POSITION: DATA STRATEGIST

LOCATION	ADVANTAGES	DISADVANTAGES
HEADQUARTERS, DLA-ZS	• STRONG ADVOCATE OF DATA PLANNING	• POTENTIAL FOR BEING OBSCURED BY AIS PRESSURES
	• PARTLY INCLUDED IN CURRENT MISSION	• POTENTIAL FOR LIMITED FUNCTIONAL AREA INVOLVEMENT
	• ESTABLISHED MECHANISM FOR ARBITRATION ROLE	• REQUIRES ADDITIONAL STAFF SKILLS/TRAINING
HEADQUARTERS, DLA-L	• CO-LOCATED WITH BUSINESS PLANNING FUNCTION	• POTENTIAL TO LIMIT FOCUS ON PROGRAM/ PLANNING INFORMATION
	• BETTER POTENTIAL FOR STRATEGIC DATA PLANNING	• LIMITED STAFF EXPERIENCE
		• REQUIRES ADDITIONAL STAFF SKILLS/TRAINING
	• BETTER POTENTIAL FOR FUNCTIONAL COOPERATION	• NEW POSITION MAY REQUIRE APPROVAL
	• CORPORATE DATA FOCUS	• NEED FOR SUPPORT STAFF WITH APPROPRIATE SKILLS
	• FLEXIBILITY FOR GROWTH	
	• ESTABLISHED MECHANISMS FOR RESOLVING RESOURCE CONFLICTS	

EXHIBIT 5-3

separate position. The choice should be determined by the amount of data to be analyzed and the importance it is to present this analysis. It would be possible to fold the Data Distribution functions into the Data Administration upon accomplishment of the initial Data Distribution functions. Exhibit 5-6 presents the advantages/disadvantages of the Data Distribution position.

	SECURITY OFFICER		DATA DISTRIBUTION ADMINISTRATOR		
	SECURITY AUTHORIZATION	HOW DATA IS DISTRIBUTED	WHEN AND WHAT DATA IS REPLICATED	HOW DATA INTEGRITY IS MAINTAINED
	DEVELOPS POLICY AND PROCEDURES FOR SECURITY AUTHORIZATION	ENFORCEMENT OF DATA STRUCTURE COMPATIBILITY AMONG DIFFERENT LOCATIONS DETERMINATION OF HOW DATA SHOULD BE DISTRIBUTED DEVELOPS POLICY AND PROCEDURE FOR DATA DISTRIBUTION	DEVELOPS POLICY AND PROCEDURE TO REPLICATE DATA CONDUCTS STUDIES OF OPERATIONAL EFFECTIVENESS	DEVELOPS POLICY AND PROCEDURE
EL	BASED ON POLICIES, DETERMINES SECURITY AUTHORIZATION TABLES AT CDA LEVEL REVIEWS SECURITY AUTHORIZATION TABLES AT OPERATIONAL SITES	REVIEWS DRAFT POLICY AND PROCEDURE PERFORMS DATA DISTRIBUTION ANALYSIS, RECOMMENDS TO HEADQUARTERS DATA CONFLICT ANALYSIS	REVIEWS DRAFT POLICY AND PROCEDURE ANALYZES WHAT AND WHEN DATA SHOULD BE REPLICATED	PERFORMS RECOVERY/INTEGRITY PLANNING REVIEWS DRAFT POLICY AND PROCEDURE
EL	BASED ON POLICIES, DETERMINES SECURITY AUTHORIZATION TABLES FOR OPERATIONAL SITE LEVEL			IMPLEMENTS RECOVERY/INTEGRITY PROCEDURES

5 of 5

DATA BASE DESIGNER/ADMINISTRATOR				SECURITY OFFICER		
SELECTION OF DATA BASE HARDWARE SOFTWARE	DATA BASE ACCESS (STRATEGIES)	RESTART/RECOVERY	SECURITY AUDITS	ADDRESSES SECURITY BREACHES	SECURITY AUTHORIZATION	
...NES ...MENTS AND ...ES VARIOUS ...RE AND ...RE ...IRATIONS	DEVELOPS STANDARDS FOR ACCESS STRATEGIES COORDINATES DLA-WIDE ACCESS STRATEGIES FOR COMMON DATA BASE HARDWARE AND SOFTWARE	DEVELOPS STANDARDS FOR SYSTEM RESTARTS AND RECOVERY	CONDUCTS AUDITS ON A SCHEDULED/RANDOM BASIS DEVELOPS POLICY AND PROCEDURES IDENTIFIES DLA-WIDE TRAINING REQUIREMENTS	DEVELOPS POLICY AND PROCEDURES FOR SECURITY BREACHES DEVELOPS DLA-WIDE STATISTICS	DEVELOPS POLICY AND PROCEDURES FOR SECURITY AUTHORIZATION	ENFORCEM... STRUCTURE... AMONG DIF... LOCATIONS DETERMINA... DATA SHOU... DISTRIBUTE... DEVELOPS ... PROCEDUR... DISTRIBUTI...
...IATES WITH ...RTERS DEFINING ...MENTS ...ES HARDWARE ...TWARE WITH ...RTERS ...ZATION	SPECIFIES AND MAINTAINS STANDARD DATA BASE ACCESS TECHNIQUES ASSISTS ANALYSTS AND PROGRAMMERS USING DATA BASE	BASED ON STANDARDS, DESIGNS MEANS FOR RESTART AND RECOVERY	PERFORMS SECURITY AUDITS AT CDA LEVEL MONITORS SECURITY AUDITS AT OPERATIONAL SITES REVIEWS DRAFT POLICY AND PROCEDURE IMPLEMENTS POLICY AND PROCEDURE	INVESTIGATES/REVIEWS SECURITY BREACHES AT CDA LEVEL AND OPERATIONAL SITE LEVEL	BASED ON POLICIES, DETERMINES SECURITY AUTHORIZATION TABLES AT CDA LEVEL REVIEWS SECURITY AUTHORIZATION TABLES AT OPERATIONAL SITES	REVIEWS D... AND PROC... PERFORMS ... DISTRIBUTI... RECOMMEN... HEADQUAR... DATA CONF...
...ENDATIONS IN ...ON OF HARDWARE ...TWARE	ASSIST PROGRAMMER WITH DATA BASE ACCESS TECHNIQUES FOR UAIS DEVELOPMENT	EXECUTE ESTABLISHED PROCEDURES FOR RESTART AND RECOVERY	PERFORMS SECURITY AUDITS AT OPERATIONAL SITE LEVEL	INVESTIGATES SECURITY BREACHES AT OPERATIONAL SITE LEVEL SUPPLIES CDAs WITH SECURITY BREACH INFRACTIONS	BASED ON POLICIES, DETERMINES SECURITY AUTHORIZATION TABLES FOR OPERATIONAL SITE LEVEL	

PROPOSED DATA/DATA BASE ADMINISTRATION FUNCTIONS IN DLA

DATA ADMINISTRATOR			DATA BA... DESIGNER/ADM...				
...ECTORY	CANONICAL DATA MODELING	TRAINING	PHYSICAL DATA BASE DESIGN	SUPPORTS TECHNICAL PERSONNEL (E.G. PROGRAMMERS)	DATA BASE PERFORMANCE	SELECTION OF DATA BASE ... SOFTWARE	
...EVELOPS POLICIES AND PROCEDURES FOR LOGIC DATA BASE DESIGN EVALUATES/APPROVES AUTOMATED TOOLS FOR LOGICAL DATA BASE DESIGN PERFORMS AUDITS OF CANONICAL ANALYSIS COORDINATES WITH CDAs REGARDING CANONICAL ANALYSIS PERFORMS STABILITY ANALYSIS		IDENTIFIES SOURCES FOR TRAINING AND/OR DEVELOPS CAPABILITY IN-HOUSE IDENTIFIES LONG-TERM DLA TRAINING REQUIREMENTS	COORDINATES WITH LOWER-LEVEL ORGANIZATION ELEMENTS DEVELOPS DATA BASE DESIGN POLICY, PROCEDURES, AND STANDARDS IDENTIFIES AND EVALUATES POTENTIAL DATA BASE PROTOTYPING TOOLS CONDUCTS AUDITS OF DATA BASE DESIGN	DEVELOPS/APPROVES TRAINING TECHNIQUES PROVIDES ADVICE TO LOWER ORGANIZATION ELEMENTS ON DATA BASE DESIGN/ADMINISTRATION	DEVELOPS TECHNIQUES AND STANDARDS REGARDING DATA BASE PERFORMANCE VALIDATES PERFORMANCE ESTIMATING TECHNIQUES WITH ACTUAL PERFORMANCE ASSISTS OPERATIONAL SITES WITH DATA BASE MONITORING AND TUNING	DETERMINES REQUIREMENTS AND EVALUATES VARIOUS HARDWARE AND SOFTWARE CONFIGURATIONS	DE... AC... CC... AC... CC... HA... SC...
PERFORMS LOGICAL DATA BASE DESIGN		IDENTIFIES INDIVIDUAL TRAINING REQUIREMENTS FOR THEIR ORGANIZATION ARRANGES FOR TRAINING TO TAKE PLACE	PERFORMS PHYSICAL DATA BASE DESIGN REVIEWS DRAFT STANDARDS TESTS AND EVALUATES POTENTIAL DATA BASE PROTOTYPES TOOLS PARTICIPATES IN AUDITS PROVIDES GUIDANCE TO OPERATIONAL SITES	PROVIDES GUIDANCE TO LOWER ORGANIZATION ELEMENTS TO OVERCOME PROBLEMS DEVELOPS/RECOMMENDS TRAINING TECHNIQUES FOR DATA BASE DESIGN	MONITORS ACTUAL PERFORMANCE OF OPERATIONAL DATA BASES TUNES DATA BASE SOFTWARE	COORDINATES WITH HEADQUARTERS DEFINING REQUIREMENTS EVALUATES HARDWARE AND SOFTWARE WITH HEADQUARTERS AUTHORIZATION	SP... ST... AC... AS... PR... DA...
			EXPLAINS PHYSICAL DESIGN TO UAIS PROGRAMMER(S) ASSISTS POTENTIAL USERS AND/OR PROGRAMMERS WITH AD HOC QUERIES	RECOMMENDS TRAINING TECHNIQUES FOR DATA BASE DESIGN PROVIDES ADVICE TO PROGRAMMERS AND/OR USERS	FOLLOWS/COMPLIES DATA BASE PERFORMANCE STANDARDS	MAKES RECOMMENDATIONS IN SELECTION OF HARDWARE AND SOFTWARE	A... W... TE... DI...

DATA STRATEGIST				DA ADMINI		
...S ACTIVITY	SUBJECT DATA CATEGORIZATION	DATA RELATED PUBLIC RELATIONS	HIGH LEVEL DATA/DATA BASE ADMINISTRATION EDUCATION	DATA ELEMENT STANDARDIZATION	DATA DICTIONARY/DIRECTORY	CANONICAL DATA
	PERFORMS GROUPING OF ENTITIES INTO SUBJECT DATA BASES COORDINATES WITH DATA ADMINISTRATOR	RESOLVES DATA RELATED CONFLICTS INTERFACES WITH HIGH LEVEL DLA MANAGEMENT (E.G., IRM REPRESENTATIVE)	PRESENTS IMPORTANCE OF DATA/DATA BASE ADMINISTRATION	DEVELOPS POLICIES AND PROCEDURES COORDINATES WITH LOWER LEVELS OF ORGANIZATION (E.G., CDAs, PLFAs) PERFORMS AUDITS COORDINATES WITH DOD DATA ELEMENT STANDARDIZATION EFFORTS COORDINATES WITH FUNCTIONAL USERS REGARDING DATA ELEMENT DEFINITION AND MEANING	DEVELOPS POLICIES AND PROCEDURES FOR DD/D UTILIZATION EVALUATES/APPROVES TYPES OF DD/D MAINTAINS DLA-WIDE DD/D (PASSIVE DD/D) PERFORMS AUDITS OF DD/D USAGE COORDINATES WITH CDAs REGARDING DD/D USAGE PROVIDES INTERFACE WITH SYSTEMS ANALYSTS AND END USERS	DEVELOPS POLICIES AND PROCEDURES FOR LOGIC DATA BASE DESIGN EVALUATES/APPROVES AUTOMATED TOOLS FOR LOGICAL DATA BASE DESIGN PERFORMS AUDITS OF CANONICAL ANALYSIS COORDINATES WITH CDAs REGARDING CANONICAL ANALYSIS PERFORMS STABILITY ANALYSIS
				PERFORMS STANDARDIZATION PROCEDURES REVIEWS DRAFT POLICIES AND PROCEDURES REFERENCES DATA DICTIONARY/DIRECTORY FOR STANDARD DATA ELEMENTS	MAINTAINS AIS DD/Ds (ACTIVE DD/D) PROVIDES INTERFACE WITH PROGRAMMERS COORDINATES WITH CONFIGURATION MANAGEMENT EFFORTS REGARDING IMPACT ANALYSIS REVIEWS DRAFT DD/D POLICIES AND PROCEDURES COORDINATES WITH HEADQUARTERS TO DEVELOP AND MAINTAIN DLA-WIDE DD/D COORDINATES AUTOMATED TOOL TESTING AND EVALUATION	PERFORMS LOGICAL DATA BASE DESIGN
				REFERENCES DATA DICTIONARY/DIRECTORY FOR STANDARD DATA ELEMENTS	ASSISTS POTENTIAL USERS AND/OR PROGRAMMERS WITH AD HOC QUERIES	

	STRATEGIC DATA PLANNING	ASSESSMENT OF FUTURE INFORMATION REQUIREMENTS	ENTITY-ANALYSIS ACTIVITY	SUBJECT DATA
HEADQUARTERS	DEVELOPS/APPROVES POLICY AND PROCEDURE PERFORMS DATA RESOURCE PLANNING FUNCTIONS COORDINATES WITH DATA ADMINISTRATORS	COLLECTS DLA GOALS AND INFORMATION REQUIREMENTS PERFORMS ASSESSMENT	PERFORMS ENTITY ANALYSIS	PERFORMS GROUPING OF ENTITIES INTO SUBJECT DATA BASES COORDINATES WITH DATA ADMINISTRATOR
CDA				
OPERATION SITES				

PROPOSED DLA D/DBA ORGANIZATIONAL STRUCTURE

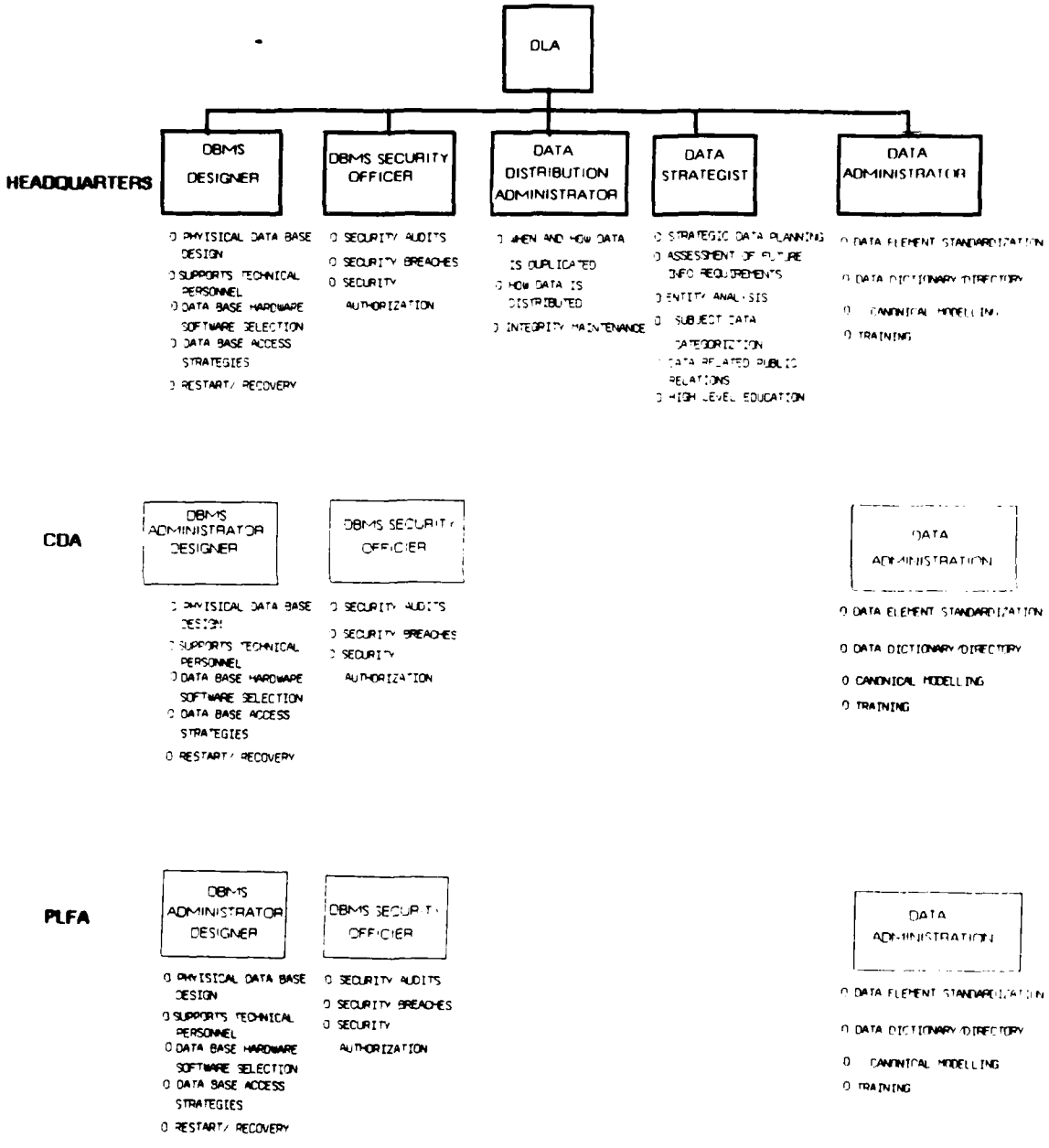


EXHIBIT 5-1.

5.2 Data Administrator

Regardless of the organization level in DLA, the Data Administrator position has greater political and semantics aspects than technical aspects. The Data Administrator should be a excellent communicator. He/she will have to work with functional people and highly technical people to accomplish the Data Administration responsibilities. Exhibit 5-4 lists the advantages/disadvantages of the Data Administrator position.

5.3 Data Base Administrator/Designer

This position is responsible for the Data Base Management System software and the physical design of databases. The skills needed to perform these functions are highly technical and the individual in this position will require training to remain knowledgable with the state of the art. Exhibit 5-5 illustrates the Advantages/Disadvantages of the potential positions of the Data Base Administrator.

5.4 Data Distribution Analyst

This position will be responsible for determining the location of data in a distributed data processing environment. These functions may be performed by the Data Administrator or as a

SECTION 5. PROPOSED ORGANIZATIONAL DESIGN

In the previous section we addressed the required D/DBA functions and supporting tools. This section addresses where should the functions and tools be located throughout DLA. These positions are presented for different organization levels (e.g., Headquarters, Central Design Agencies, Primary Level Field Organizations) within DLA. Exhibit 5-1 illustrates the suggested D/DBA locations within the DLA organization. Exhibit 5-2 identifies the responsibilities of each position at the various DLA organization levels. A discussion of the position locations follow.

5.1 Data Strategist

This position will require a senior level individual who is knowledgeable in the overall management and functional business goals and objectives and can communicate well with the DLA top level management. The important consideration is the support received from management. The Data Strategist must be in a position to diplomatically change the organizations view and management of data. Two logical locations for this function are DLA-L and DLA-Z. Exhibit 5-3 lists the advantages/disadvantages of the Data Strategic position.

SECTION 6. IMPLEMENTATION PLAN FACTORS

This section discusses factors pertaining to the development of a D/DBA Administration program implementation plan. A detailed plan needs to be coordinated with DLA Headquarters, the CDAs, and the PLFAs. As stated earlier, managing an effective data/data base environment must have the full support of upper management. This is necessary to overcome resistance to change and to foster a DLA-wide "state of mind" that data is a key organization resource. The following factors should be considered when designing an implementation plan.

6.1 Phased Approach

A phased approach is preferable. Considering the size and complexity of DLA, a single large effort is doomed to great expense and failure. Use of a phased program implementation will:

- Capitalize on existing D/DBA administration policies and functions that are already in place.
- Distribute the resource requirements for implementation over a longer period of time allowing a more balanced use of personnel and funds
- Permit sufficient lead time for the CDAs and PLFAs to prepare for program implementation
- Allow DLA Headquarters an initial period of time to begin a large organizational learning process
- Enable DLA Headquarters to focus on certain D/DBA activities which will produce positive substantial early results

Implementing an D/DBA program in DLA will require a considerable effort by many individuals and organizations dispersed throughout the agency. By following a phased approach, time will be available to create an understanding of the needs, benefits, and philosophy of the D/DBA environment and provide an organizational setting to foster a sense of participation on a DLA-wide basis.

We suggest that the D/DBA concepts enumerated in Section 3 be implemented first within an AIS administrative area such as SAMMS. This would involve several major SAIS, (e.g., SAMMS, DWASP, MOCAS) and several DLA organizations.

6.2 DLA Wide Education Program

The commitment to implement a D/DBA program places responsibilities on anyone involved with the use and management of data. This includes both the Data Processing personnel and users. To make this D/DBA effort effective and sustaining, DLA will have to commit to an ongoing and continuous education program that addresses D/DBA topics and concepts. During the initial phase, an overview of D/DBA and its impact upon the DLA communities should be presented to appropriate personnel regarding the D/DBA nature and its expected benefits. As the program evolves, greater detail educational programs will be developed, and more technical D/DBA orientations, classes, and courses can be conducted.

The various positions described above may require special seminars and vendor specific packages. Training for the technical aspects are listed in Exhibit 6-1.

TRAINING REQUIREMENTS

Position	Training Area
Security/Privacy Analyst	Security Privacy DBMS Concepts
Data Distribution Analyst	Logical Data Design DBMS Concepts DD/D
Data Base Administrator/ Designer	DBMS Concepts DBMS Physical Design DD/D
Data Administrator	Logical Data Design DBMS Concepts DD/D
Data Strategist	Logical Data Design DBMS Concepts DD/D Security Privacy

EXHIBIT 6-1

Many of these courses are available commercially and may be on Videotape. DLA should invest in the method that will provide the greatest return on investment.

6.3 Excessive Application Development Pressure

An organization is always going to be requested to develop applications quickly and under a large amount of pressure. The organization must develop a policy to effectively address these requests while still maintaining the D/DBA in perspective. If this is not done,

the D/DBA program will not obtain the benefits that it promises (e.g., lower maintenance costs).

The D/DBA program should have a set of priorities by which to judge requests. Efforts to bypass or ignore the priorities, should be quickly brought to a halt by management.

6.4 Conversion Considerations

At some point the organization must decide whether to convert

- files to application or preferably subject data bases
- application databases to subject databases.

These decisions are difficult, but can be made rationally. If the existing system is performing properly, the users requirements are being satisfied and the maintenance costs are reasonable, then a conversion should be performed on another system.

If a conversion is chosen, it should be well planned and discipline should prevail. To increase the percentage for success the following items should be addressed:

- The use of automated tools (e.g., data dictionaries, data modeling) to support the effort
- The data should be in a normalized form
- The data structure from the current system should be used if it is still valid
- The conversion should be phased to continue to support the user in a adequate manner

A conversion is the joint effort of the Data Strategist, Data Administrator, Data Base Administrators/Designer and the application design personnel. The conversion will only be as successful as the amount of effort expended to plan and prepare for it.

6.5 Automated Tools

Previously automated tools were discussed as to their importance to the D/DBA environment. The functions performed by the Data Administrator(s) and Data Base Administrator(s)/Designer(s) are large and complex. The metadata defined and the relationships require the support of automated tools. These should be investigated by DLA and standard tools obtained (either developed or acquired).

We suggest that as part of an initial implementation phase, DLA should quickly decide on automated tools for their Data Dictionary (e.g., MSS, TIS) and a Data Modeling Tool (e.g., Data Designer).

Procedures will have to be integrated with the tools to ensure standard usage throughout the DLA. Where necessary, bridges need to be developed to transfer data from one tool to another with minimal human intervention. Without these tools the D/DBA functions will be unable to meet the needs of the DP community and may contribute to the failure of the D/DBA effort.

6.6 Summary

The implementation of a D/DBA activity should not be taken lightly, because there are many factors that may defeat it. These include

- Organization Politics
- Lack of a clear set of goals
- Lack of a training plan
- Lack of top management commitment

A phased controlled approach should be taken with identifiable milestones to demonstrate progress to the management and organizational community at large.

APPENDIX A

ABBREVIATIONS

AIS	Automated Information System
BDAM	Basic Direct Access Method
CAFS	Content Addressable File Store
CDA	Central Design Agency
D/DBA	Data/Data Base Administration
DBMS	Data Base Management System
DD/D	Data Dictionary/Directory
DLA	Defense Logistics Agency
DLSC	Defense Logistics Services Center
DMS	Data Management System
DSAC	Defense Systems Automation Center
IDMS	Integrated Database Management System
IDS	Integrated Data Store
IMS	Information Management System
IRM	Information Resource Management
LCM	Life Cycle Management
Metadata	Data about data
PLFA	Primary Level Field Activity
SAIS	Standard Automated Information System
UAIS	Unique Automated Information System
VSAM	Virtral Storage Access Method

APPENDIX B

BRIEFING SLIDES

Defense Logistics Agency
Office of Telecommunications and Information Systems

Data/Data Base Administration Analysis Progress Review and Briefing

December, 1984

Project Objectives

- Determination of the Requirements for Effective Data/Data Base Administration Among the DLA Organizational Elements
- Recommendation of Data/Data Base Administration Program Which Can Be Used To Manage Effectively the DLA's Automated Information Resources
- Recommendation of Data/Data Base Administration Structure and the Necessary Policies Required To Administer the Automated Information Management Program
- Development of a Time-Phased Plan for Implementing the Data/Data Base Administration Program.

Information Sources

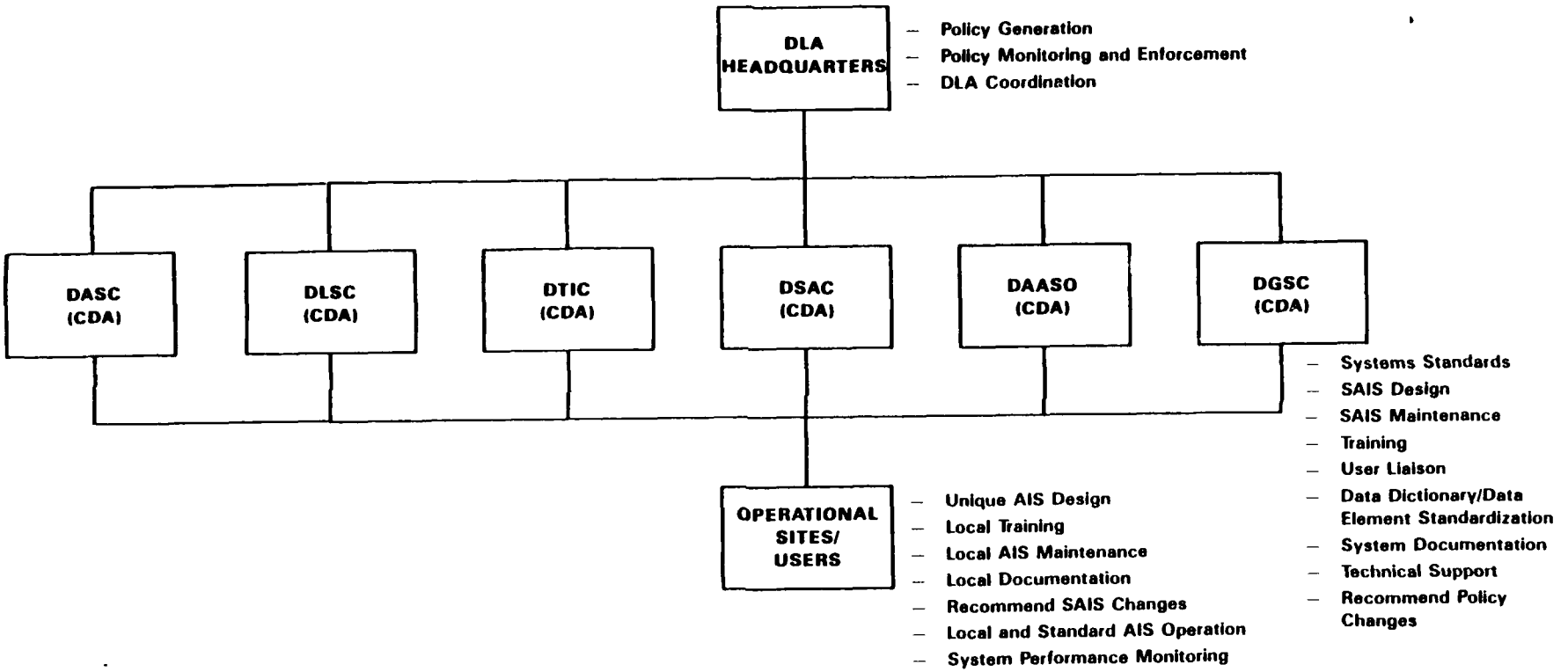
Documents Used

- DLA Telecommunication and Information Systems Plan (DTIP), 1983–1984.
- DOD Logistics Data Resource Management System User Guide (LOGDRMS) DOD 4000.25, Jan. 1984.
- DOD Logistics Data Element Standardization and Management Program Procedures (LOGDESMAP) DOD 4000.25, Jan. 1984.
- Life-Cycle Management of DLA AISs DLAR 4730.1, July 1982.
- DLA ADS Life-Cycle Management Specs. DLAH 4730.1, May 1978.
- Administration of the DLA ADP Program DLAR 4700.1, June 1978.
- DLS Systems Automation Center Mission DLAR 5805.7, Oct. 1981.
- Maintenance of DLA Systems Automation Center Assigned AIS DLAR 4730-3, Nov. 1979.
- Plan for DLA Corporate AIS Management Structure, Jan. 1983.
- Automated Data Processing Management Manual DLAM 4700.1, Nov. 1983.

Sites Interviewed

- DTIC, Alexandria, Virginia
- DSAC-TD, Columbus, Ohio
- DSAC-MB, Columbus, Ohio
- DCSC, Columbus, Ohio
- DCASR Cleveland, Cleveland, Ohio
- DLSC, Battle Creek, Michigan
- Defense Depot, Ogden, Utah
- DASC, Alexandria, Virginia
- DFSC, Alexandria, Virginia
- DLA-ZS, Alexandria, Virginia
- DLA-ZW, Alexandria, Virginia
- DLA-ZP, Alexandria, Virginia

Current Environment



Standard, Policy, Or Procedure	Document(s)	Comments	Assigned Responsibility
AIS Design	DLAR 4700.1	Defines Initiation of Design Only.	DLA-Z, PSE
Life-Cycle Management	DLAR 4700.1	Provides Overview Only.	DLA-Z, PSE, Op Sites
	DLAR 4730.1		
	DLAH 4730.1 Vol. VIII	Defines Documentation of LCM Phases, Not Procedures for Actually Doing Them.	DLA-Z, PSE, CDA, AIS Admin
Data Management Responsibilities *	DLAR 4700.1	General Responsibilities During LCM Phases.	DLA-Z, PSE, Op Sites
	DLAR 4730.3	Defines SCR Process Responsibilities.	DLA-Z, PSE, DSAC
	DLAR Mission Statements	Contains Very High-Level Mission Objectives; any Data Management Responsibilities Mentioned is Purely Coincidental.	DLA-Z, AIS Admin
Documentation	DLAR 4700.1	General, Defines What Document Must Do.	
	DODI 7935.1	Defines Documentation at Generic Level.	DLA-Z, PSE, DSAC
	DLAR 4730.1	Overview	
	DLAH 4730.1	Inconsistent in Level of Detail. PLFA's Have Created SOPs to Supplement.	PSE, AIS Admin CDA, PSE, AIS Admin, Op Sites

Note: * = Specific to Data/Data Base Management.

Standard, Policy, Or Procedure	Document(s)	Comments	Assigned Responsibility
Data Base Design *	DLAH 4730.1	Defines Documentation Format of Data Base Specs. Only.	CDA, PSE, AIS Admin Op Sites
Data Base Update/ Retrieval *	None	Determined by DBA at Field Site.	None
Backup and Recovery *	None	Determined by Individual Programmer or DBA at Field Site.	None
Standards Monitoring and Enforcement	DLAR 4700.1 DLAR 5000.12	Defines Reviews, Tests, and Approvals Within LCM. Defines Review of Functional Requirements.	DLA-Z, Op Sites
System Performance Monitoring	DLAM 4700.1	Provides Tools Available for Monitoring Hardware Performance	CDA, Op Sites
AIS Interfacing	DLAR 4700.1	Defines Its Existence Only.	DLA-Z, PSE
Data Sharing *	DLAR 4710.4 DLAR 4700.1	States That DLA Will Participate in Data Sharing.	DLA-Z

Note: * = Specific to Data/Data Base Management.

AD-A153 031 DLA DATA/DATA BASE ADMINISTRATION ANALYSIS(U) ADVANCED TECHNOLOGY INC RESTON VA R GIROUARD 26 FEB 85 DLAH00-83-D-0225 2/2

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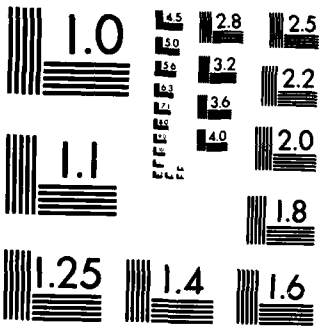


Existing Standards, Policies, and Procedures (Continued)

Standard, Policy, Or Procedure	Document(s)	Comments	Assigned Responsibility
Data Element Standardization *	DLAR 4700.1	States That It Will Be Done But Not How To Carry It Out.	DLA-Z, Op Sites
	DLAR 5805.7 (DSAC Mission)	Defines DSAC as Having Data Element Standardization Responsibility	DSAC
	DLAR 4700.1	Defines DLA-Z as DLA Representative in DOD Data Element Standardization.	DLA-Z
	DOD 5000.11	Defines DOD Wide Date Element *Standardization in Generic Sense.*	
	DLAR 4705.5 DESS and MSS	Dictionaries Present at DSAC, Not Used.	
AIS Maintenance/ Enhancement	DLAR 4730.3	Defines SCR Process of Approvals.	DLA-Z, PSE, DSAC
	DLAR 4730.4	Defines SCR Hot-Line Process.	
Data Security/Privacy *	DLAR 5200.5 DLAR 5400.21 DLAR 5200.1		
System Cost Monitoring	DLAR 4700.1	Costing Definition Falls Within LCM.	Op Sites

Note: * = Specific to Data/Data Base Management.

Data/Data Base Administration

Current Environment

DLA'S EXPERIENCE WITH DBMS AND DATA DICTIONARIES

SITE	SYSTEM	DATA BASE(S)	DBMS	DATA DICTIONARY
DLSC	DIDS	TIR SSR	DMS II	MEDIC
DTIC	DROLS	TR (WUIS) (IR&D) (PP)	DMS 1100	MANUAL
DCASR'S	MOCAS	CONTRACTS	TOTAL TIS	DESS/MSS
DSAC	DEVELOPMENT	DEVELOPMENT	TIS DBDAM SAMSAM	DESS/MSS
	RESEARCH	RESEARCH	ADABAS IMS	
DASC	ARMS DFAMS OTHERS	ARMS DFAMS OTHERS	M204	MODEL 204
DGSC	MOWASP	AWARE	ENCOMPASS	DESS/MSS
DPSC	DISMS	SUBSISTENCE	TIS	DESS/MSS
DDOU	DWASP	WAREHOUSE RECEIVING	TIS	DESS/MSS
SEVERAL	APCAPS	PERSONNEL	TIS	DESS/MSS
DISC	WEAPONS SYSTEMS	J-52/T-64 WEAPONS SYSTEMS	SEED	DESS/MSS

Data/Data Base Administration

Current Environment

TIS IMPLEMENTATION STATUS

DLA SITES	TIS INSTALLED	APCAPS	DWASP	DISMS	MOCAS	DAISY	DIPEC
DCSC	NO	P	P				
DESC	YES	I					
DGSC	NO	P	P				
DISC	NO						
DPSC	YES	I		I	I		
DDMP	YES	I	P				
DDMT	YES	I	P				I
DDOU	YES	I	I				
DDTC	YES	I	P				
DCRA	YES	I			I		
DCRB	YES	I			I		
DCRI	YES	I			I		
DCRL	YES	I			I		
DCRN	YES	I			I		
DCRO	YES	I			I		
DCRS	YES	I			I		
DCRT	YES	I			I		
DSAC	YES	I	I	I	I	I	I
DASC	YES	P					
DLSC	YES					I	
DTIC	NO						

LEGEND:
P = PLANNED
I = IMPLEMENTED

CURRENT DLA D/DBA SIGNIFICANT ISSUES

RECOGNIZED ISSUE	REQUIREMENT
• LACK OF DLA-WIDE STRATEGIC PLANNING OF DATA	DLA-WIDE STRATEGIC DATA PLANNING
• LACK OF DETAILED KNOWLEDGE ON DEGREE OF DATA SHARING ACROSS SYSTEMS AND FUNCTIONS	INTEGRATED DATA PLANNING, INTEGRATED AUTOMATED TOOLS
• CURRENT D/DBA POLICIES/PROCEDURES EMBEDDED IN LCM PROCEDURES INHIBITS EFFECTIVE MANAGEMENT OF DATA AS A RESOURCE	MORE EXPLICATION OF D/DBA OBJECTIVES, POLICIES, PROCEDURES
• LACK OF AN EXTENSIVE AND INSTITUTIONALIZED D/DBA TRAINING/EDUCATION PROGRAM	APPROPRIATE EDUCATION FOR ALL INVOLVED END-USERS

CURRENT DLA D/DBA SIGNIFICANT ISSUES (CONTINUED)

RECOGNIZED ISSUE	REQUIREMENT
• ENFORCEMENT OF DATA ELEMENT STANDARDS	MORE CENTRALIZED AUTHORITY AND CONTROL
• CURRENT DATA DICTIONARIES DO NOT FULLY SUPPORT DATA ELEMENT STANDARDIZATION	IMPLEMENTATION OF ACTIVE AND PASSIVE DATA DICTIONARIES THAT INTERFACE WITH ONE ANOTHER
• FLEXIBILITY	DEVELOP PROCEDURES TO PERMIT DATA-BASE CHANGE WITH MINIMUM IMPACT ON APPLICATION SYSTEMS

PRINCIPLES OF A DATA/DATA BASE ENVIRONMENT

TO EFFECTIVELY MANAGE THE DATA BASE ENVIRONMENT THESE THREE PRINCIPLES NEED TOP-LEVEL ACCEPTANCE:

- DATA-BASE IS A CHANGE IN MANAGEMENT, NOT MERELY A CHANGE IN SOFTWARE
- IN A WELL-MANAGED DATA-BASE ENVIRONMENT, DATA ARE RECOGNIZED AS AN ORGANIZATION RESOURCE
- DATA ARE SUFFICIENTLY IMPORTANT TO MERIT SPECIALIZED AND HIGH-LEVEL MANAGEMENT ATTENTION

FOUR TYPES OF DATA/DATA-BASE ENVIRONMENT DISCERNABLE IN DLA

MANAGEMENT OF THE DLA DATA/DATA BASE ENVIRONMENT REQUIRES DISTINGUISHING BETWEEN TYPES OF DATA-BASE ENVIRONMENTS:

- TYPE I: FILES
- TYPE II: APPLICATION DATA-BASES
- TYPE III: SUBJECT DATA-BASES
- TYPE IV: DATA-BASES FOR MANAGEMENT INFORMATION SYSTEMS

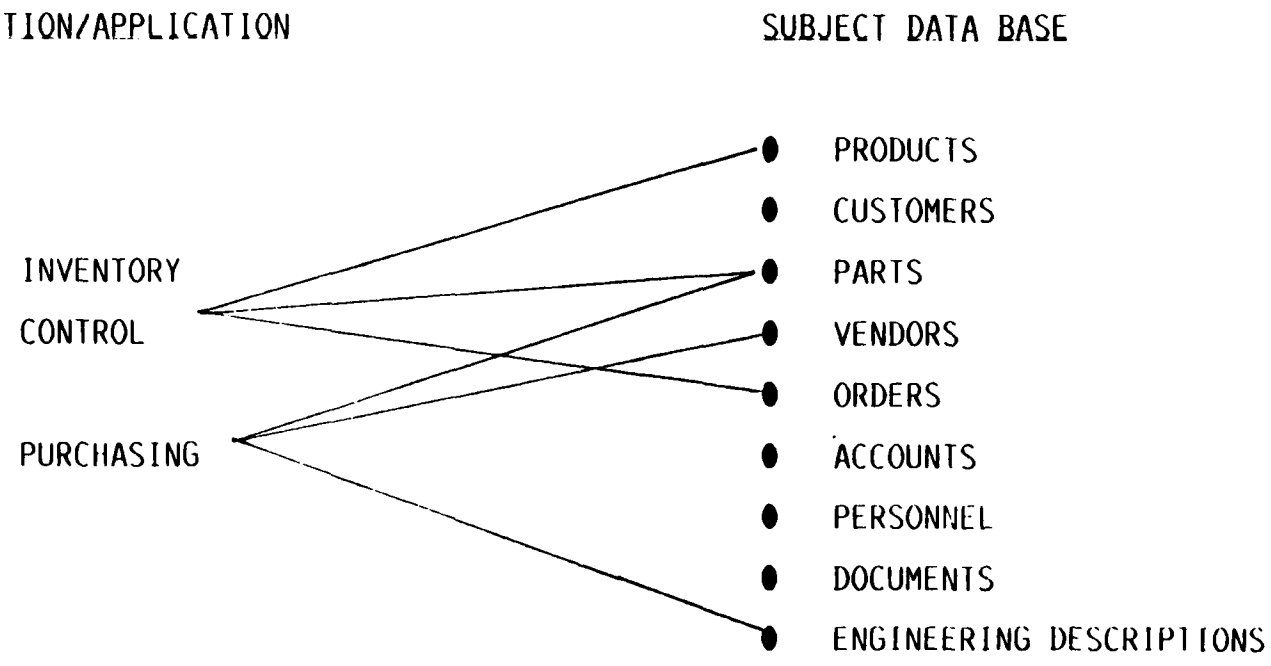
FOUR TYPES OF DATA/DATA-BASE ENVIRONMENT (CONTINUED)

TYPE III ENVIRONMENT: SUBJECT DATA BASES

- DATA-BASES ARE DESIGNED AND STORED INDEPENDENTLY OF THE FUNCTION OR SPECIFIC APPLICATION FOR WHICH THEY ARE USED
- DATA FOR DLA SUBJECTS SUCH AS CUSTOMERS, VENDORS OR PERSONNEL ARE ASSOCIATED AND REPRESENTED IN SHARED DATA-BASES
- CHARACTERISTICS: THOROUGH DATA ANALYSIS AND MODELING NEEDED, WHICH TAKES TIME, MUCH LOWER MAINTENANCE COSTS
- LEADS EVENTUALLY (BUT NOT IMMEDIATELY) TO FASTER APPLICATION DEVELOPMENT AND DIRECT USER INTERACTION WITH THE DATA BASES
- REQUIRES A CHANGE IN TRADITIONAL SYSTEMS ANALYSIS METHODS, AND IN OVERALL DP MANAGEMENT
- EXAMPLES OF SOFTWARE: IMS, IDMS, IDS, ADABAS

FOUR TYPES OF DATA/DATA-BASE ENVIRONMENT (CONTINUED)

TYPE III: SUBJECT DATA BASES



FOUR TYPES OF DATA/DATA-BASE ENVIRONMENT (CONTINUED)

TYPE IV ENVIRONMENT: DATA-BASES FOR MANAGEMENT INFORMATION SYSTEMS

- DATA-BASES ORGANIZED FOR SEARCHING AND FAST INFORMATION RETRIEVAL RATHER THAN FOR HIGH-VOLUME PRODUCTION RUNS.
- EMPLOYS SOFTWARE DESIGNED AROUND INVERTED FILES, INVERTED LISTS, OR SECONDARY KEY SEARCH METHODS.
- NEW DATA-ITEM TYPES CAN BE ADDED DYNAMICALLY AT ANY TIME
- GOOD END-USER QUERY AND REPORT GENERATION FACILITIES

GENERAL DATA/DATA BASE ADMINISTRATION DESIGN FRAMEWORK

THREE DIMENSIONS:

- REQUIRED D/DBA FUNCTIONS -- WHAT FUNCTIONS HAVE TO BE PERFORMED TO EFFECTIVELY MANAGE THE D/DBA ENVIRONMENT IN DLA

- REQUIRED D/DBA SUPPORT TOOLS -- WHAT TOOLS ARE NEEDED TO SUPPORT THE FUNCTIONS

- REQUIRED ORGANIZATIONAL STRUCTURE -- WHERE SHOULD THE FUNCTIONS AND TOOLS BE LOCATED THROUGHOUT DLA

REQUIRED D/DBA FUNCTIO

- TOP LEVEL DATA STRATEGY
- DATA ADMINISTRATION
- DATA-BASE ADMINISTRATION/DESIGN
- DATA DISTRIBUTION ADMINISTRATION
- AUDITING AND SECURITY

DATA DICTIONARY SUPPORT TOOLS

- DATA DICTIONARY ALONG WITH DLA ENTITY MODELS FROM STRATEGIC DATA PLANNING IS A CORPORATE RESOURCE
- MAIN PURPOSE IS TO ENFORCE THE USE OF DATA REPRESENTATIONS WHICH ARE CENTRALLY STANDARDIZED AND DEFINED
- TO ACHIEVE COMMON DICTIONARY USE OVER A LARGE SPAN OF DLA A SUITABLY HIGH LEVEL OF MANAGEMENT COMMITTMENT IS NEEDED
- A "PASSIVE" DICTIONARY WHICH USES ONE PARTICULAR DBMS BUT CAN STORE INFORMATION ABOUT DATA IN OTHER DBMS (E.G., IBM'S DB/DC)
- AN "ACTIVE" DICTIONARY-TIGHTLY COUPLED TO A PARTICULAR DBMS (E.G., IDMS)

LOGICAL DATA MODELING SUPPORT TOOLS

- LOGICAL DATA MODELING

  - SUPPORTING DLA-WIDE STRATEGIC DATA PLANNING; DETERMINING SUBJECT DATA BASES

  - SUPPORTS A SPECIFIC FUNCTIONAL AREA (E.G., CONTRACTING, LOGISTICS SERVICES, SUPPLY OPERATIONS); SYNTHESIZE SEPARATE USER VIEWS OF DATA

  - DOCUMENTS OPTIMAL THIRD NORMAL FORM STRUCTURES

- EXAMPLES OF DATA MODELING TOOLS ARE DATA DESIGNER, PSL/PSA VIS

- PREFERRED TOOL IS DATA DESIGNER

REQUIRED D/DBA SUPPORT TOOLS

TO EFFECTIVELY MANAGE THE DATA/DATA-BASE ENVIRONMENT REQUIRES AUTOMATED TOOLS IN THE FOLLOWING AREAS:

- LOGICAL DATA MODELING
- DATA ELEMENT ANALYSIS/STANDARDIZATION
- DATA DISTRIBUTION ANALYSIS
- PHYSICAL DATA-BASE DESIGN
- MACHINE PERFORMANCE

GENERAL DATA/DATA BASE ADMINISTRATION DESIGN FRAMEWORK

THREE DIMENSIONS:

- REQUIRED D/DBA FUNCTIONS -- WHAT FUNCTIONS HAVE TO BE PERFORMED TO EFFECTIVELY MANAGE THE D/DBA ENVIRONMENT IN DLA

- REQUIRED D/DBA SUPPORT TOOLS -- WHAT TOOLS ARE NEEDED TO SUPPORT THE FUNCTIONS

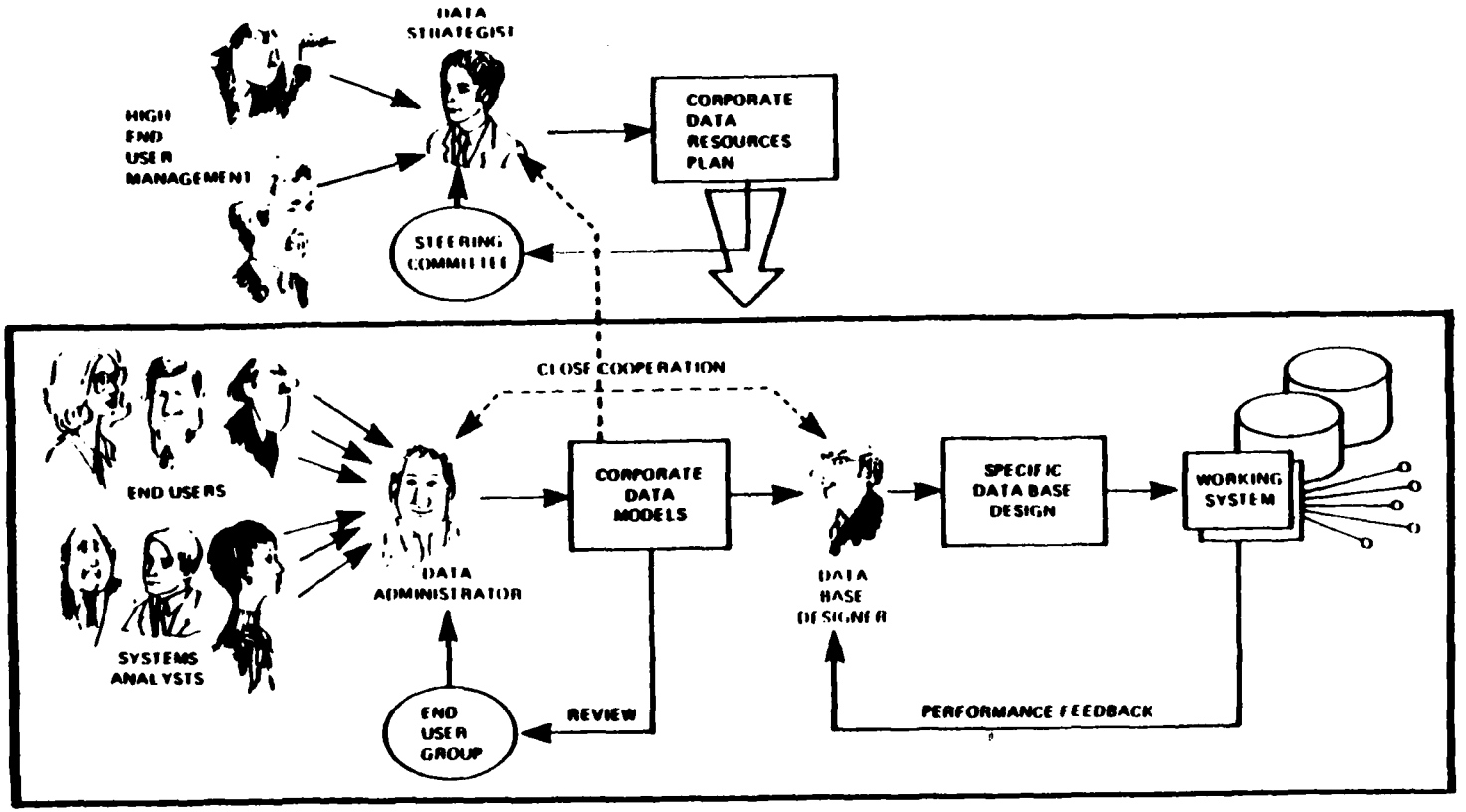
- REQUIRED ORGANIZATIONAL STRUCTURE -- WHERE SHOULD THE FUNCTIONS AND TOOLS BE LOCATED THROUGHOUT DLA

RESPONSIBILITY BREAKDOWN

	USER GROUP	PROGRAMMER AND SYSTEMS ANALYST	DATA BASE DESIGNER	DATA ADMINISTRATOR	DATA DISTRIBUTION ADMINISTRATOR	TOP LEVEL DATA STRATEGIST	AUDITOR	SECURITY OFFICER
TOP LEVEL DATA STATEGY								
Planning correspondence the and data base strategy				C		PRIME		
Planning what corporate data resources are needed						PRIME		
Planning responsibilities and job descriptions						PRIME		
Determining data base standards and design guidelines						PRIME		
Data base software evaluation and selection			C	C	C	PRIME		
Selection of a data dictionary and modelling tool				C		PRIME		
Control of correspondence dictionary maintenance				P		PRIME		
DATA ADMINISTRATION								
Data analysis	P	P		PRIME				
Field definition and design	P	P		PRIME				
Logical model design			P	PRIME				
Security analysis	C	C		PRIME				
Logical model validation	P	P		PRIME			P	P
Planning what subset data items are to exist				PRIME	P	P		
DATA DISTRIBUTION ADMINISTRATION								
Data distribution analysis				P	PRIME			
Deciding what data structures should reside at what locations				P	PRIME	P		
Dependable recovery/integrity planning					PRIME		P	
Conflict analysis					PRIME		P	
Enforcement of compatibility of data structure between different locations				P	PRIME	P		
DATA BASE DESIGN								
Design of schemas used in one data base system			PRIME	P				
Physical data base design for that system			PRIME	C				
Integrity/recovery planning for that system			PRIME				P	
Performance analysis			PRIME					
Subschema/view design (including subschema/view or derivation locations)	C	P	PRIME	P			P	
Planning the data base's compatibility with existing files			PRIME	P				
INDEPENDENT FILE DESIGN								
Design of files which do not use data base systems	C	PRIME				P		
AUDITING & SECURITY								
Auditability design	C	C	C	P	P	P	PRIME	P
Security design and design	C	C	P	P	P	P	P	PRIME

Key PRIME = PRIME RESPONSIBILITY
P = PARTICIPATING RESPONSIBILITY
C = CONSULTING WHEN NECESSARY

GENERAL DESIGN FRAMEWORK



AUDITING AND SECURITY FUNCTIONS

- AUDITABILITY DESIGN
- SECURITY STRATEGY AND DESIGN
- REQUIRES A SECURITY OFFICER POSITION

DATA DISTRIBUTION ADMINISTRATION FUNCTIONS

- DATA DISTRIBUTION ANALYSIS
  - AVOID INTEGRITY AND/OR DEADLOCK SITUATIONS
  - DISTRIBUTE WORKLOAD (I.E., DATA) ACROSS MULTIPLE MACHINES
- DISTRIBUTED RECOVERY/INTEGRITY PLANNING
- CONFLICT ANALYSIS
- ENFORCEMENT OF DATA STRUCTURE COMPATIBILITY
- REQUIRES A DATA DISTRIBUTION ADMINISTRATOR POSITION
  - COULD BE MERGED WITH DATA ADMINISTRATOR OR BE SEPARATE POSITION

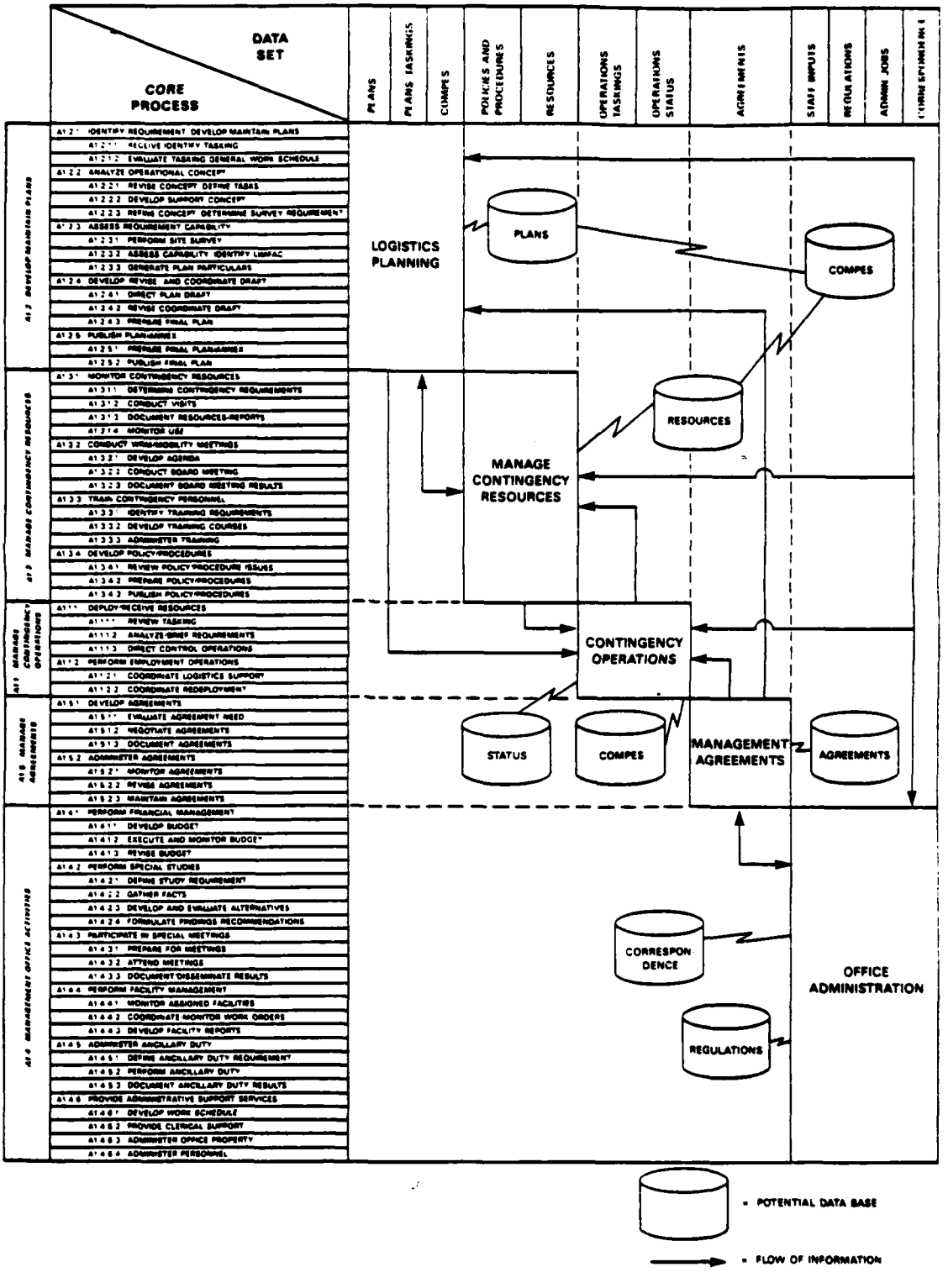
DATA-BASE DESIGN FUNCTIONS

- DATA-BASE SOFTWARE EVALUATION AND SELECTION
- DETERMINE DATA-BASE STANDARDS AND DESIGN TECHNIQUES; DBMS TRAINING
- REQUIRES A DATA-BASE DESIGNER POSITION

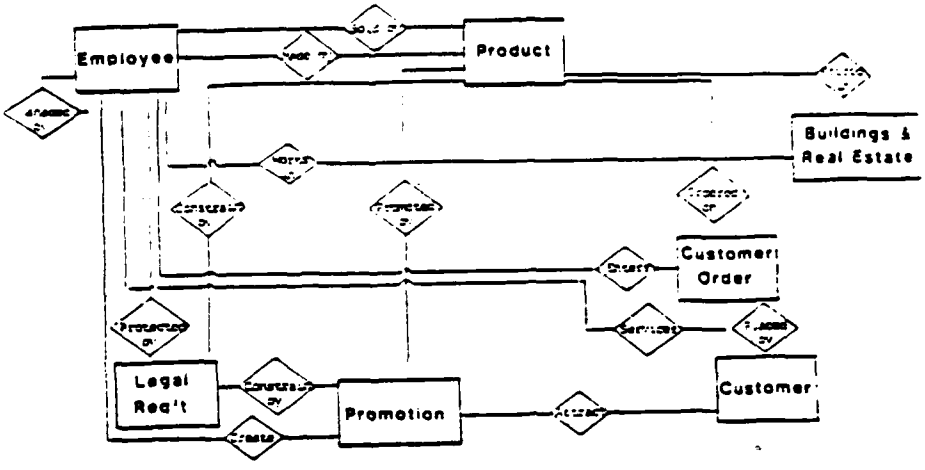
DATA ADMINSTRATION FUNCTIONS

- LOGICAL DATA MODELING AND VALIDATION
  - INDIVIDUAL FUNCTIONAL OR SUBJECT AREA PERSPECTIVES
- DATA ELEMENT ANALYSIS AND STANDARDIZATION
  - IDENTIFY DATA ELEMENT DEFINITIONS AND NAMING CONVENTIONS (E.G., SYNONYMS)
  - STANDARDIZE AS APPROPRIATE
- MAINTENANCE OF DATA DICTIONARY/DIRECTORY(IES)
- CANONICAL SYNTHESIS
  - CREATES SOFTWARE INDEPENDENT DATA MODEL(S) (THIRD NORMAL FORM)
  - DESCRIBES THE INHERENT NATURE OF THE DATA

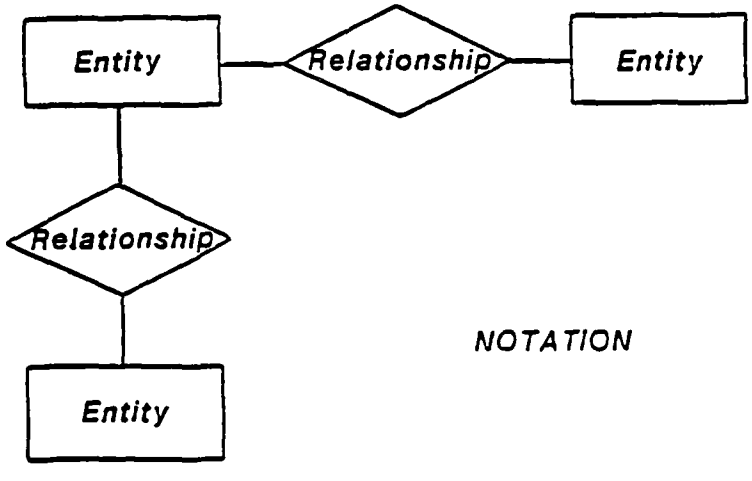
TOP-LEVEL DATA PLANNING/STRATEGY FUNCTIONS (CONTINUED)



LGX CURRENT INFORMATION ARCHITECTURE



Data Architecture

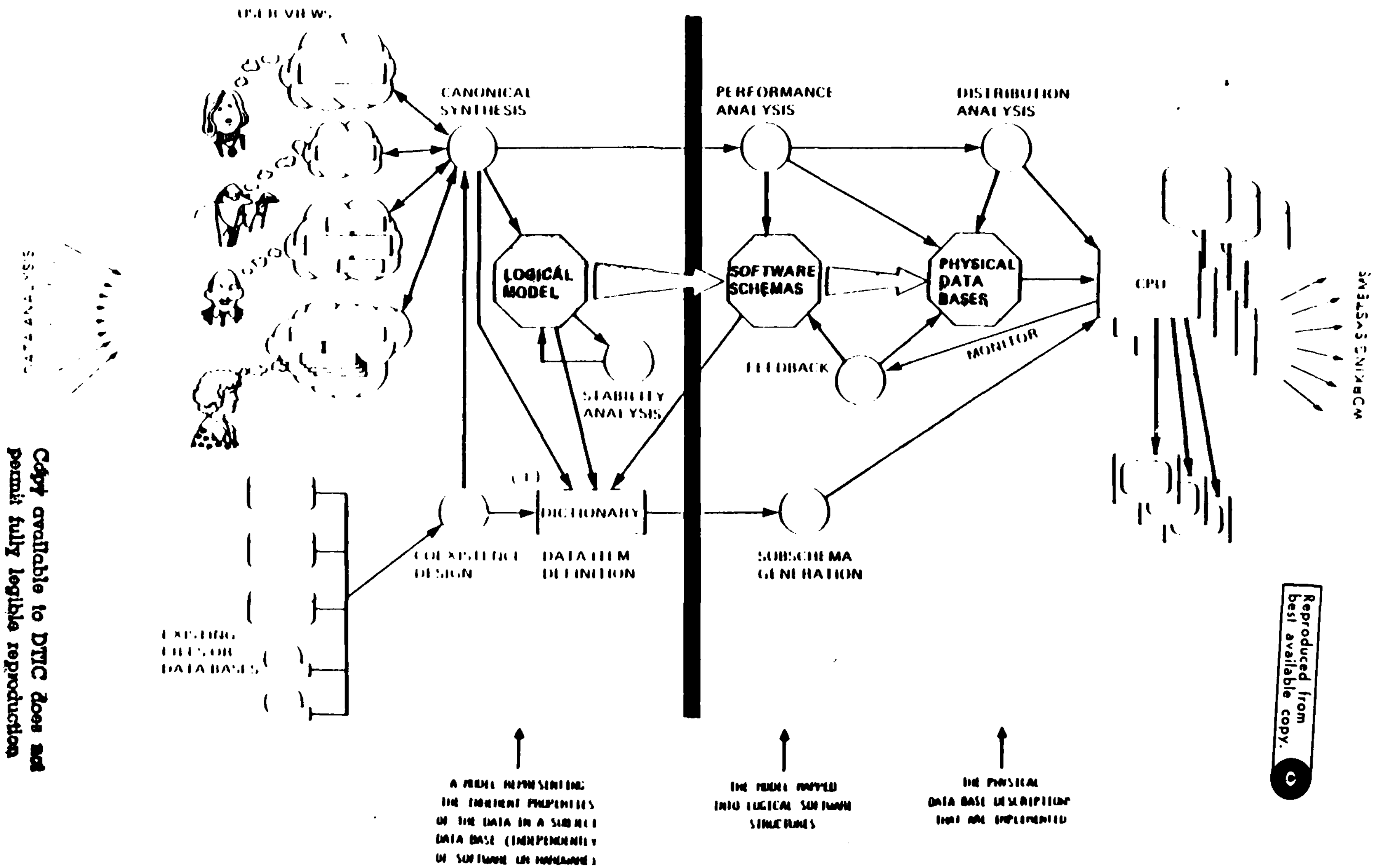


NOTATION

TOP-LEVEL DATA PLANNING/STRATEGY FUNCTIONS

- DLA WIDE PLANNING OF DATA
  - HIGH LEVEL VIEW - ENTERPRISE MODEL; FUNCTIONAL AREA VIEWS
  - DLA WIDE DATA RESOURCE PLAN; IDENTIFIES WHO ARE THE 'OWNERS' OF DATA AND WHO ARE THE 'USERS' OF DATA
- ASSESSMENT OF FUTURE INFORMATION REQUIREMENTS
  - DEVELOPMENT OF AN ENTITY-RELATIONSHIP OVERVIEW CHART CLUSTERING ENTITIES INTO SUBJECT DATA BASES
  - PROVIDES AN INDEPENDENT VIEW OF HOW EXISTING SYSTEMS INTERACT WITH THE BUSINESS FUNCTIONS

THREE REPRESENTATIONS OF DATA



SUPPORT TOOLS (CONTINUED)

INDEPENDENT OR INTEGRATED DICTIONARY

- CHOICE OF DICTIONARY PRESENTS PROBLEMS IN A MULTIPLE DBMS ENVIRONMENT
- USUALLY A COMPROMISE IS TO USE THE DICTIONARY OF THE MOST WIDELY USED DBMS (SUCH AS TIS IN DLA)
- CHOICE OF DICTIONARY AND THE FACILITIES WHICH LINK TO IT NEED TO BE A PART OF THE STRATEGIC TOP-DOWN DATA PLANNING

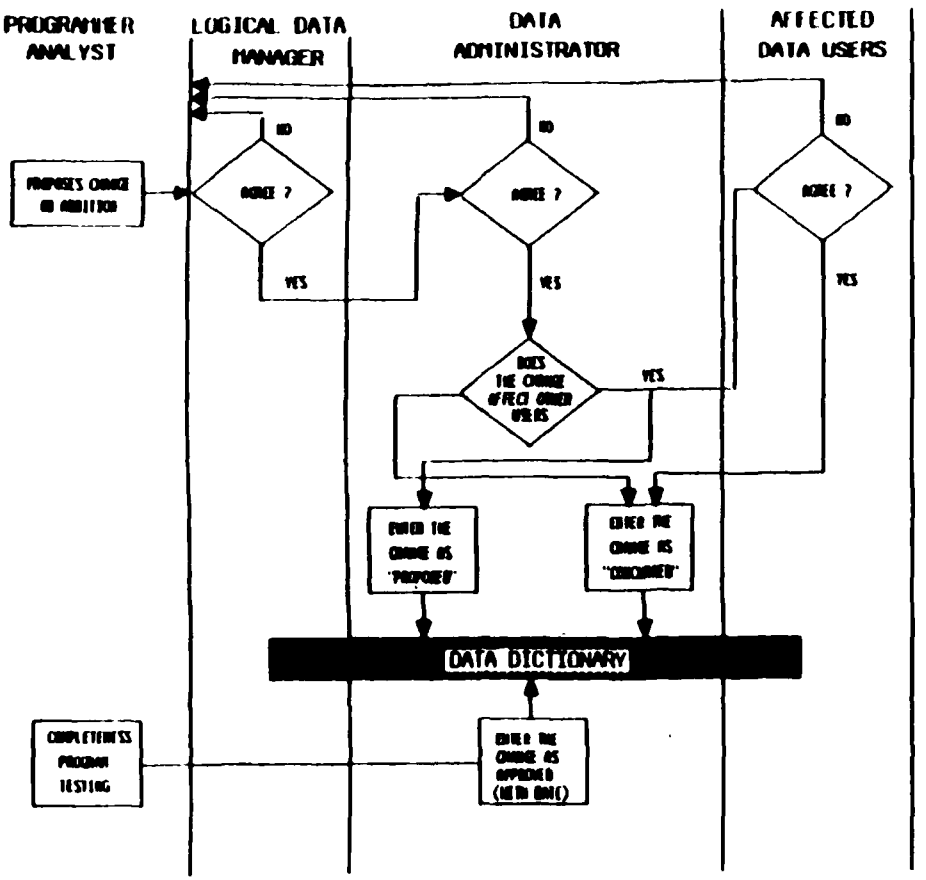
SUPPORT TOOLS (CONTINUED)

USE OF DATA DICTIONARY TO CONTROL CHANGES

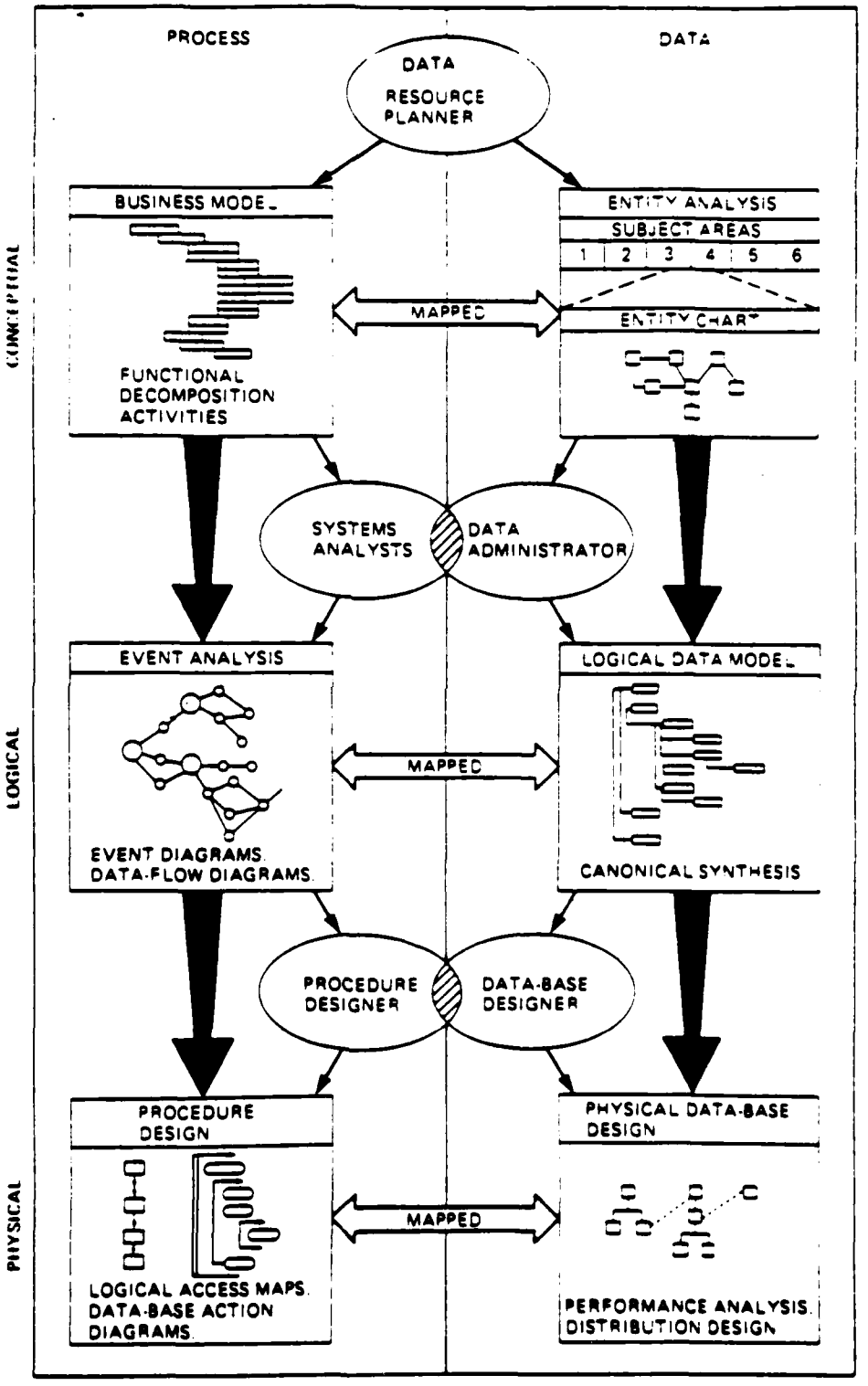
- ASSIST CONFIGURATION MANAGEMENT EFFORTS TO PERFORM IMPACT ANALYSIS
- INTEGRATED DATA DICTIONARIES PROVIDE CHANGES TO APPROPRIATE SOFTWARE ENTITIES AUTOMATICALLY

SUPPORT TOOLS (CONTINUED)

CONTROL OF CHANGE (CONTINUED)



SUPPORT TOOLS (CONTINUED)



GENERAL DATA/DATA BASE ADMINISTRATION DESIGN FRAMEWORK

THREE DIMENSIONS:

- REQUIRED D/DBA FUNCTIONS -- WHAT FUNCTIONS HAVE TO BE PERFORMED TO EFFECTIVELY MANAGE THE D/DBA ENVIRONMENT IN DLA

- REQUIRED D/DBA SUPPORT TOOLS -- WHAT TOOLS ARE NEEDED TO SUPPORT THE FUNCTIONS

- REQUIRED ORGANIZATIONAL STRUCTURE -- WHERE SHOULD THE FUNCTIONS AND TOOLS BE LOCATED THROUGHOUT DLA

FACTORS AND PREMISES IMPACTING DLA D/DBA ORGANIZATIONAL STRUCTURE

- FOCUS ON DATA, PRIMARILY, AND IN A NARROWER SENSE, DATA WHICH IS AUTOMATED (REASONABLE FIRST STEP)

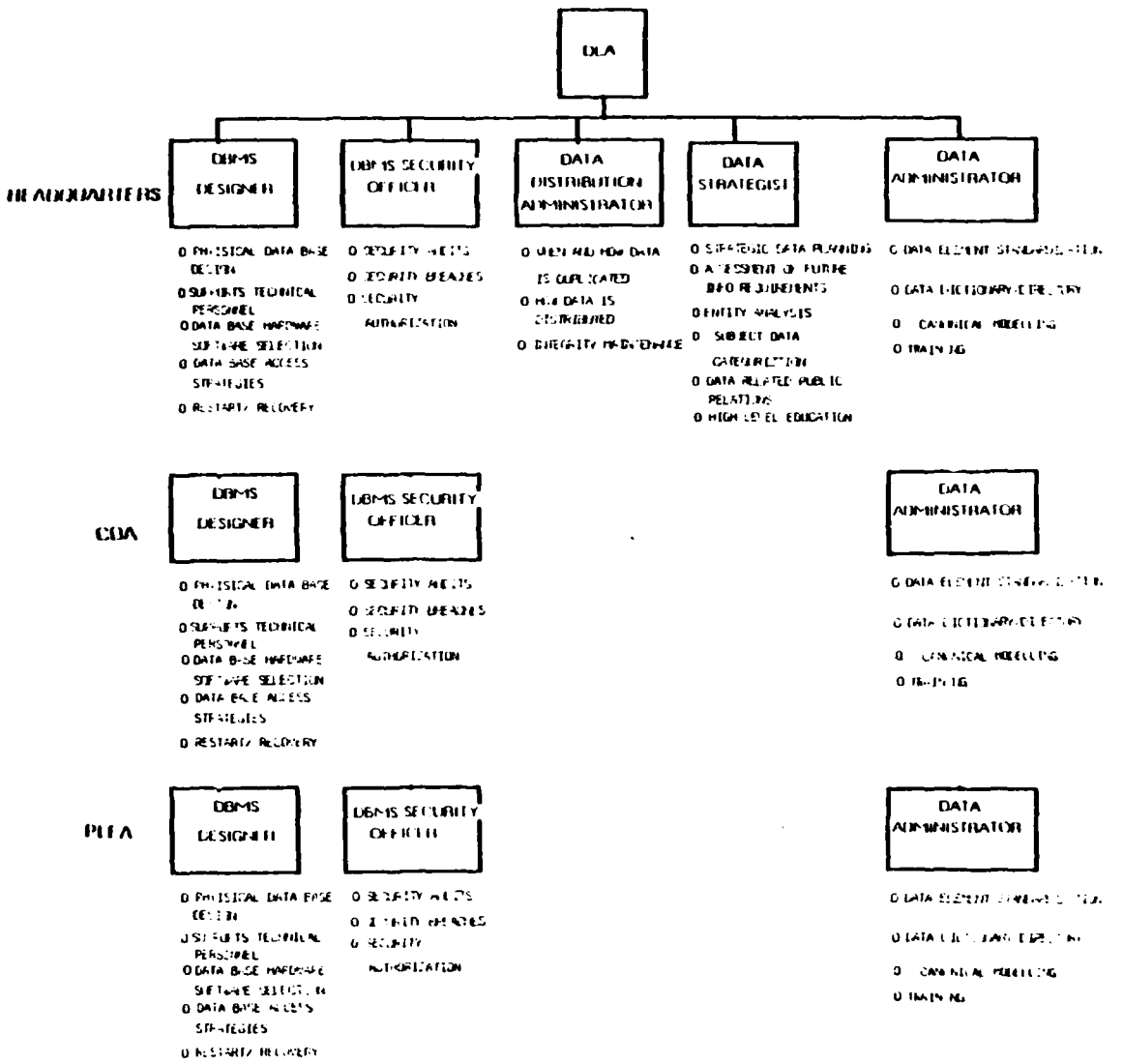
- THE PROPOSED D/DBA ORGANIZATION SHOULD TAKE ADVANTAGE OF EXISTING DLA EXPERTISE AND SHOULD BUILD UPON (NOT DUPLICATE) EXISTING ORGANIZATION STRUCTURES ESTABLISHED TO SUPPORT DLA PROGRAMS

- THE D/DBA FUNCTIONS WILL NEED TO BE DISTRIBUTED TO ESTABLISH A SYSTEM OF CHECKS AND BALANCES IN MANAGING DATA

- D/DBA SHOULD BE MADE A PART OF THE WAY DLA DOES BUSINESS (NOT AN OVERHEAD FUNCTION) BY PROVIDING SERVICE ALONG WITH CONTROLS

- THE INITIAL D/DBA ORGANIZATION STRUCTURE SHOULD BE FLEXIBLE IN DESIGN TO ACCOMMODATE CHANGES IN SCOPE AND PROGRAM DIRECTION

PROPOSED DLA D/DBA ORGANIZATIONAL STRUCTURE



	STRATEGIC DATA PLANNING	ASSESSMENT OF FUTURE INFORMATION REQUIREMENTS	ENTITY-ANALYSIS ACTIVITY	SU
HEADQUARTERS	DEVELOPS/APPROVES POLICY AND PROCEDURE PERFORMS DATA RESOURCE PLANNING FUNCTIONS COORDINATES WITH DATA ADMINISTRATORS	COLLECTS DLA GOALS AND INFORMATION REQUIREMENTS PERFORMS ASSESSMENT	PERFORMS ENTITY ANALYSIS	PERFORMS GROUI ENTITIES INTO SU DATA BASES COORDINATES WI ADMINICTRATOR
CDA				
OPERATION SITES				

DATA STRATEGIST

ENTITY-ANALYSIS ACTIVITY	SUBJECT DATA CATEGORIZATION	DATA RELATED PUBLIC RELATIONS	HIGH LEVEL DATA/DATA BASE ADMINISTRATION EDUCATION	DATA ELEMENT STANDARDIZATION	DATA DICTIONARY/DIRECTORY	
ENTITY	PERFORMS GROUPING OF ENTITIES INTO SUBJECT DATA BASES COORDINATES WITH DATA ADMINISTRATOR	RESOLVES DATA RELATED CONFLICTS INTERFACES WITH HIGH LEVEL DLA MANAGEMENT (E.G., IRM REPRESENTATIVE)	PRESENTS IMPORTANCE OF DATA/DATA BASE ADMINISTRATION	DEVELOPS POLICIES AND PROCEDURES COORDINATES WITH LOWER LEVELS OF ORGANIZATION (E.G., CDAs, PLFAs) PERFORMS AUDITS COORDINATES WITH DOD DATA ELEMENT STANDARDIZATION EFFORTS COORDINATES WITH FUNCTIONAL USERS REGARDING DATA ELEMENT DEFINITION AND MEANING	DEVELOPS POLICIES AND PROCEDURES FOR DD/D UTILIZATION EVALUATES/APPROVES TYPES OF DD/D MAINTAINS DLA-WIDE DD/D (PASSIVE DD/D) PERFORMS AUDITS OF DD/D USAGE COORDINATES WITH CDAs REGARDING DD/D USAGE PROVIDES INTERFACE WITH SYSTEMS ANALYSTS AND END USERS	DEVELOPS POI PROCEDURES DATA BASE DE EVALUATES/AP AUTOMATED T LOGICAL DATA PERFORMS AN CANONICAL A COORDINATES REGARDING C ANALYSIS PERFORMS ST ANALYSIS
				PERFORMS STANDARDIZATION PROCEDURES REVIEWS DRAFT POLICIES AND PROCEDURES REFERENCES DATA DICTIONARY/DIRECTORY FOR STANDARD DATA ELEMENTS	MAINTAINS AIS DD/Ds (ACTIVE DD/D) PROVIDES INTERFACE WITH PROGRAMMERS COORDINATES WITH CONFIGURATION MANAGEMENT EFFORTS REGARDING IMPACT ANALYSIS REVIEWS DRAFT DD/D POLICIES AND PROCEDURES COORDINATES WITH HEADQUARTERS TO DEVELOP AND MAINTAIN DLA-WIDE DD/D COORDINATES AUTOMATED TOOL TESTING AND EVALUATION	PERFORMS LO BASE DESIGN
				REFERENCES DATA DICTIONARY/DIRECTORY FOR STANDARD DATA ELEMENTS	ASSISTS POTENTIAL USERS AND/OR PROGRAMMERS WITH AD HOC QUERIES	

PROPOSED DATA/DATA BASE ADMINISTRATION FUNCTIONS IN DLA

DATA ADMINISTRATOR				DESIGNI		
...DICTIONARY/DIRECTORY	CANONICAL DATA MODELING	TRAINING	PHYSICAL DATA BASE DESIGN	SUPPORTS TECHNICAL PERSONNEL (E.G. PROGRAMMERS)	DATA BASE PERFORMANCE	SELECTIO... SOFT...
...S AND DD/D ...VES ...DE DD/D ...OF DD/D ...H CDAs ...SAGE ...CE WITH ...S AND	DEVELOPS POLICIES AND PROCEDURES FOR LOGIC DATA BASE DESIGN EVALUATES/APPROVES AUTOMATED TOOLS FOR LOGICAL DATA BASE DESIGN PERFORMS AUDITS OF CANONICAL ANALYSIS COORDINATES WITH CDAs REGARDING CANONICAL ANALYSIS PERFORMS STABILITY ANALYSIS	IDENTIFIES SOURCES FOR TRAINING AND/OR DEVELOPS CAPABILITY IN-HOUSE IDENTIFIES LONG-TERM DLA TRAINING REQUIREMENTS	COORDINATES WITH LOWER-LEVEL ORGANIZATION ELEMENTS DEVELOPS DATA BASE DESIGN POLICY, PROCEDURES, AND STANDARDS IDENTIFIES AND EVALUATES POTENTIAL DATA BASE PROTOTYPING TOOLS CONDUCTS AUDITS OF DATA BASE DESIGN	DEVELOPS/APPROVES TRAINING TECHNIQUES PROVIDES ADVICE TO LOWER ORGANIZATION ELEMENTS ON DATA BASE DESIGN/ADMINISTRATION	DEVELOPS TECHNIQUES AND STANDARDS REGARDING DATA BASE PERFORMANCE VALIDATES PERFORMANCE ESTIMATING TECHNIQUES WITH ACTUAL PERFORMANCE ASSISTS OPERATIONAL SITES WITH DATA BASE MONITORING AND TUNING	DETERMINES REQUIREMENTS AND EVALUATES VARIOUS HARDWARE AND SOFTWARE CONFIGURATIONS
...Ds ...CE WITH ...H ...ORTS ...D/D ...CEDURES ...R ...) ...NTAIN ...OMATED	PERFORMS LOGICAL DATA BASE DESIGN	IDENTIFIES INDIVIDUAL TRAINING REQUIREMENTS FOR THEIR ORGANIZATION ARRANGES FOR TRAINING TO TAKE PLACE	PERFORMS PHYSICAL DATA BASE DESIGN REVIEWS DRAFT STANDARDS TESTS AND EVALUATES POTENTIAL DATA BASE PROTOTYPES TOOLS PARTICIPATES IN AUDITS PROVIDES GUIDANCE TO OPERATIONAL SITES	PROVIDES GUIDANCE TO LOWER ORGANIZATION ELEMENTS TO OVERCOME PROBLEMS DEVELOPS/RECOMMENDS TRAINING TECHNIQUES FOR DATA BASE DESIGN	MONITORS ACTUAL PERFORMANCE OF OPERATIONAL DATA BASES TUNES DATA BASE SOFTWARE	COORDINATES WITH HEADQUARTERS DEF... REQUIREMENTS EVALUATES HARDWA... AND SOFTWARE WIT... HEADQUARTERS AUTHORIZATION
...I USERS ...MERS ...RIES			EXPLAINS PHYSICAL DESIGN TO UAIS PROGRAMMER(S) ASSISTS POTENTIAL USERS AND/OR PROGRAMMERS WITH AD HOC QUERIES	RECOMMENDS TRAINING TECHNIQUES FOR DATA BASE DESIGN PROVIDES ADVICE TO PROGRAMMERS AND/OR USERS	FOLLOWS/COMPLIES DATA BASE PERFORMANCE STANDARDS	MAKES RECOMMENDATIONS SELECTION OF HARD... AND SOFTWARE

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	DATA BASE DESIGNER/ADMINISTRATOR				SECURI OFFICI	
BASE PERFORMANCE	SELECTION OF DATA BASE HARDWARE SOFTWARE	DATA BASE ACCESS (STRATEGIES)	RESTART/RECOVERY	SECURITY AUDITS	ADDRESSES SECURITY BREACHES	SECURI
QUES ASE IMANCE NIQUES NAL BASE TUNING	DETERMINES REQUIREMENTS AND EVALUATES VARIOUS HARDWARE AND SOFTWARE CONFIGURATIONS	DEVELOPS STANDARDS FOR ACCESS STRATEGIES COORDINATES DLA-WIDE ACCESS STRATEGIES FOR COMMON DATA BASE HARDWARE AND SOFTWARE	DEVELOPS STANDARDS FOR SYSTEM RESTARTS AND RECOVERY	CONDUCTS AUDITS ON A SCHEDULED/RANDOM BASIS DEVELOPS POLICY AND PROCEDURES IDENTIFIES DLA-WIDE TRAINING REQUIREMENTS	DEVELOPS POLICY AND PROCEDURES FOR SECURITY BREACHES DEVELOPS DLA-WIDE STATISTICS	DEVELOPS POLICY / PROCEDURES FOR SECURITY AUTHOR
BASES	COORDINATES WITH HEADQUARTERS DEFINING REQUIREMENTS EVALUATES HARDWARE AND SOFTWARE WITH HEADQUARTERS AUTHORIZATION	SPECIFIES AND MAINTAINS STANDARD DATA BASE ACCESS TECHNIQUES ASSISTS ANALYSTS AND PROGRAMMERS USING DATA BASE	BASED ON STANDARDS, DESIGNS MEANS FOR RESTART AND RECOVERY	PERFORMS SECURITY AUDITS AT CDA LEVEL MONITORS SECURITY AUDITS AT OPERATIONAL SITES REVIEWS DRAFT POLICY AND PROCEDURE IMPLEMENTS POLICY AND PROCEDURE	INVESTIGATES/REVIEWS SECURITY BREACHES AT CDA LEVEL AND OPERATIONAL SITE LEVEL	BASED ON POLICIES, DETERMINES SECURI AUTHORIZATION TAB CDA LEVEL REVIEWS SECURITY AUTHORIZATION TAB OPERATIONAL SITES
S DATA CE	MAKES RECOMMENDATIONS IN SELECTION OF HARDWARE AND SOFTWARE	ASSIST PROGRAMMER WITH DATA BASE ACCESS TECHNIQUES FOR UAIS DEVELOPMENT	EXECUTE ESTABLISHED PROCEDURES FOR RESTART AND RECOVERY	PERFORMS SECURITY AUDITS AT OPERATIONAL SITE LEVEL	INVESTIGATES SECURITY BREACHES AT OPERATIONAL SITE LEVEL SUPPLIES CDAs WITH SECURITY BREACH INFRACTIONS	BASED ON POLICIES, DETERMINES SECURI AUTHORIZATION TAB FOR OPERATIONAL SI LEVEL

SECURITY OFFICER		DATA DISTRIBUTION ADMINISTRATOR		
...HITY BREACHES	SECURITY AUTHORIZATION	HOW DATA IS DISTRIBUTED	WHEN AND WHAT DATA IS REPLICATED	HOW DATA INTEGRITY IS MAINTAINED
	DEVELOPS POLICY AND PROCEDURES FOR SECURITY AUTHORIZATION	ENFORCEMENT OF DATA STRUCTURE COMPATIBILITY AMONG DIFFERENT LOCATIONS DETERMINATION OF HOW DATA SHOULD BE DISTRIBUTED DEVELOPS POLICY AND PROCEDURE FOR DATA DISTRIBUTION	DEVELOPS POLICY AND PROCEDURE TO REPLICATE DATA CONDUCTS STUDIES OF OPERATIONAL EFFECTIVENESS	DEVELOPS POLICY AND PROCEDURE
	BASED ON POLICIES, DETERMINES SECURITY AUTHORIZATION TABLES AT CDA LEVEL REVIEWS SECURITY AUTHORIZATION TABLES AT OPERATIONAL SITES	REVIEWS DRAFT POLICY AND PROCEDURE PERFORMS DATA DISTRIBUTION ANALYSIS, RECOMMENDS TO HEADQUARTERS DATA CONFLICT ANALYSIS	REVIEWS DRAFT POLICY AND PROCEDURE ANALYZES WHAT AND WHEN DATA SHOULD BE REPLICATED	PERFORMS RECOVERY/INTEGRITY PLANNING REVIEWS DRAFT POLICY AND PROCEDURE
	BASED ON POLICIES, DETERMINES SECURITY AUTHORIZATION TABLES FOR OPERATIONAL SITE LEVEL			IMPLEMENTS RECOVERY/INTEGRITY PROCEDURES

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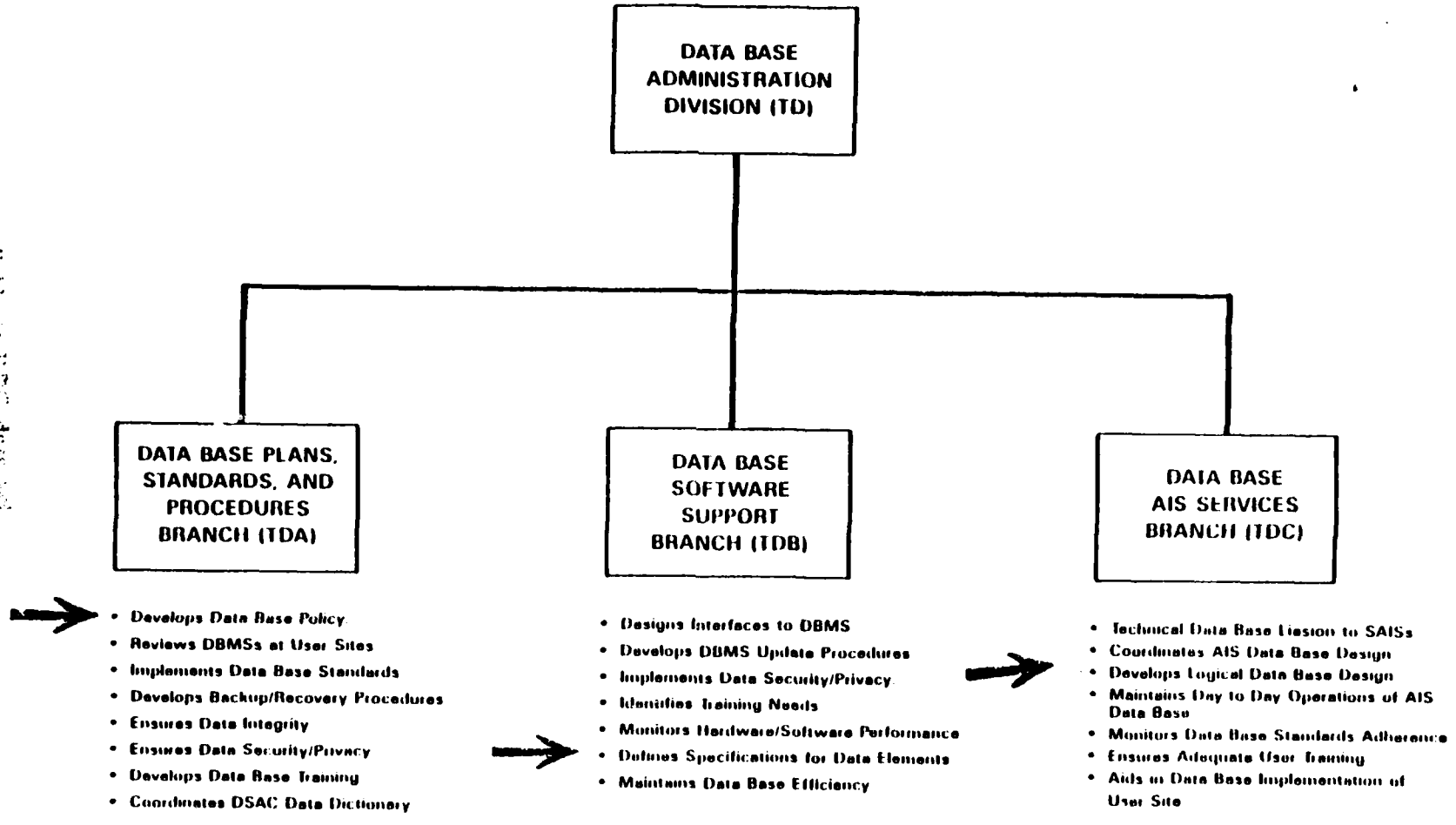
PROPOSED DSAC DBA ORGANIZATION



RECOMMENDED FUTURE STEPS FOR DLA

- SHORT TERM
  - -- FORMALIZE DATABASE ADMINISTRATION (AUTOMATED DATA)
  - -- BEGIN DLA WIDE DATA MODELING
  - -- REVIEW SUPPORT TOOLS
- LONG TERM
  - -- COMPLETE INFORMATION RESOURCE MANAGEMENT (IRM) STUDY

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